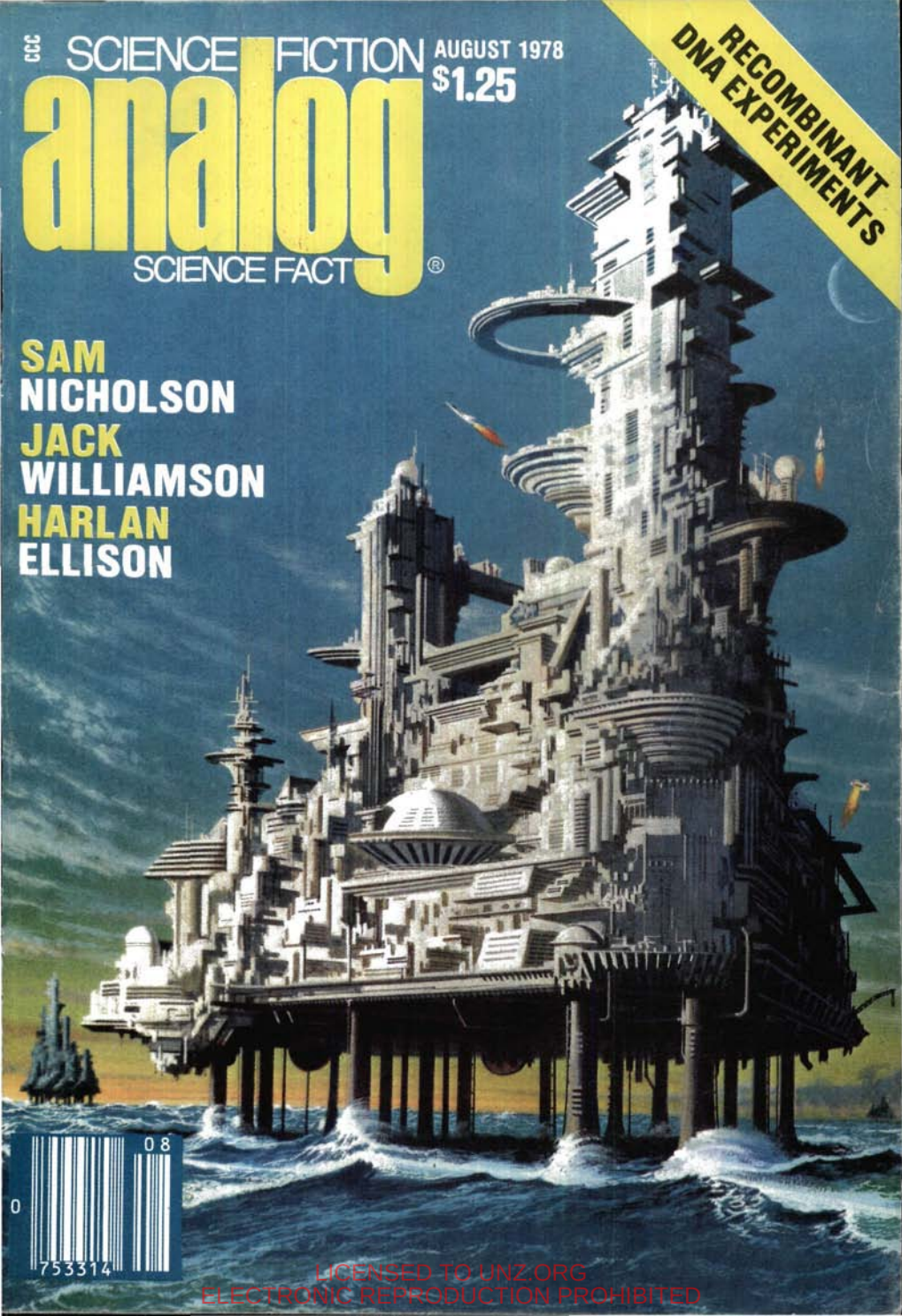

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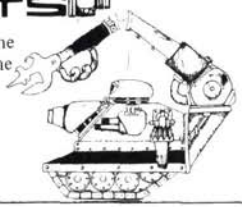

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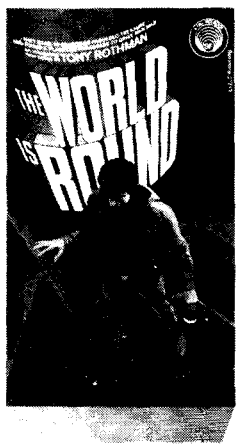

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Next Issue on Sale
August 1, 1978
$10.00 per year in the U.S.A.
$1.25 per copy

Cover by Dean Ellis

Vol. XCVIII, No. 8
AUGUST 1978

SCIENCE FICTION
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POSTMASTER: SEND FORM 3579 to ANALOG SCIENCE FICTION/SCIENCE FACT, BOX 5205, BOULDER, COLORADO 80323.

Editorial and Advertising offices: Conde Nast Building, 350 Madison Avenue, New York, New York 10017.

Subscriptions: Analog Science Fiction/Science Fact, Box 5205, Boulder, Colorado 80323

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BIOLOGICAL IGNORANCE

Dr. Dean R. Lambe

Some years ago, a well-known science fiction editor cynically lamented the number of story manuscripts that crossed his desk with beginnings like: "The last man on Earth laboriously climbed to the top of the Empire State Building and scanned the night sky. At last he located that celestial pinpoint, Alpha Centauri, the new home of mankind."

Of course, the majority of readers had no trouble agreeing with the editorial decision to read no further. Science fiction fans tend to know that Centaurus is a Southern Hemisphere constellation between Hydra and the Southern Cross. Only a truly earth-shaking plot, "A Thrust of Greatness" á la Stanley Schmidt, could ever put Alpha Centauri in the New York sky. (And, a more contemporary editorial might well quibble about the pollution-piercing abilities of even a star of that magnitude.) But, how about a manuscript which begins: "Johnston watched with horror, as the Snipe mutated before his eyes—rapidly evolving new genes in response to the increased radiation from Gnurg, the Snipe's near-nova sun." Would editor and reader reject that one too? I should hope so, but would they reject it as quickly as they would the first miserable example? And, would the rejection be based on the writing style, the questionable astrophysics, or the truly terrible biology? Unfortunately, the last choice is generally just that—the last choice, for we, as a society, are biologically ignorant.

Even SF readers, who tend to be better educated in science than the

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general populace, are guilty of this ignorance. Granted, much of early science fiction did its teething on physics, on nuts and bolts, on zap guns and spaceships. But even H. G. Wells's invading Martians had biological problems at the end, and Mary Shelley—perhaps the Mother of SF—had Dr. Frankenstein working with the biology of her day. Why then, do we still have plots where the word "clone" could be replaced by the word "robot" with no meaningful change in the story? Why do writers religiously adhere to the laws of physics for the Gnurg solar system, but wreak havoc with the laws of natural selection? Why? Because we are biologically ignorant.

Let's face it, when Junior asks "Why is the sky blue?" most parents in our society have an answer, even if it's nonsense like "Well, Junior, that's because the sky reflects the blue of the oceans." (Yes, I really know a woman who said that—a primary school teacher yet! But, that's not the point, she did have an answer, an answer in terms of physics, an answer that actually bears some meaningful relationship to the correct, and complex explanation.) But suppose Junior had asked "Why do we have fingernails and not claws like bow-wow?" I shudder to think what that school teacher would have answered. Maybe: "Because it's easier to use nail polish on fingernails?" Think about it. Are fingernails any less a part of our daily lives than blue sky? (Don't answer that if you live in Los Angeles.) Whatever the answer, even if it's a wrong response, we're not likely to be very comfortable with it, it's not physics, it's not a part of our cultural heritage.

Yes, our cultural heritage is physics. For centuries, our art, our literature, our everyday speech have reflected that division of scientific knowledge. Thus, it is no accident that we speak of the mass of data, the inertia of groups, the friction of ideas, the attraction of opposites. Unfortunately, there is no similar pervasiveness of biological concepts in our culture, and that biological ignorance leads to real problems, since we have entered a Biological Revolution. The "man on the street" knows that atoms split and fuse, and is often uncomfortable when he thinks about what happens when atoms do. But does that same proverbial man know that living cells split and fuse as well; does he ponder the implications of artificial cell splitting? Perhaps, but such information, such new biology, is difficult to integrate—the general knowledge just isn't there. Granted, our common man may speak of the "evolution of ideas," but it's highly likely that he means a straight line between thought A and final thought Z. That's teleological thinking, that's biological ignorance.

What Darwin Said. For well over a century, controversy has surrounded "the theory of evolution." Evolution, however, is a fact—the theoretical questions are only concerned with the *mechanisms* of evolution. And the accepted mechanism, of course, is that

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notion credited to Charles Darwin—natural selection. Charles Darwin did not originate the idea of natural selection in 1859; the basic concepts had been published much earlier by Darwin's grandfather, Erasmus, but the younger Darwin did produce a strongly-reasoned, empirically-supported case for natural selection. (And Darwin might have delayed publication for years, had not friends told him that Alfred Wallace was about to present the same argument before the British Royal Society.)

On the Origin of Species by Means of Natural Selection is based on three observable facts of nature, and two deductions which Darwin made from those facts. Fact One: all organisms tend to increase geometrically (there are always a lot more children around than there are parents). Fact Two: in spite of this progressive tendency for increase, the numbers of a given species actually remain reasonably constant (the amoebae haven't covered the Earth). Hence, Deduction One: there must be a *struggle for existence*—not "survival of the fittest" as Darwin's friend, Herbert Spencer called this assumption—since more young are produced by each species than can, and do, survive. And finally, Fact Three: there is variation in all species (even identical twins aren't exactly alike). Darwin then argued, on the basis of the above logic, for his Deduction Two: natural selection (since there is a struggle for existence between individuals, and since individuals vary, obviously some variations will be more prone to survive than others . . . differential survival . . . natural selection). As a corollary, Darwin further noted that much of the variation between individuals is hereditary, so the effects of differential survival will tend to accumulate from generation to generation. This assumption does not mean, however, that natural selection necessarily leads to change in a particular direction (e.g., "improvement") with each successive generation.

Darwin spent much of his life, and most of his writings, providing concrete evidence for his logical argument—the Darwinian "Big Picture." In the ensuing years, no fault has been found with his reasoning. The contemporary viewpoint on evolution, "the modern synthesis" as the late Julian Huxley called it, has been much augmented by information that Darwin lacked, but the "Big Picture" hasn't changed. Thus, modern genetics, and more recent discoveries in molecular biology, have added to our understanding of hereditary mechanisms to a considerable degree (and corrected Darwin's own erroneous ideas about heredity), but these discoveries have merely revealed the fine grain—the microscopic "brush strokes"—of the "Big Picture."

There are no "missing links" in neo-Darwinian evolution. Unfortunately, such faulty thinking persists today, on the part of both the uninformed and those who would substitute a particular doctrine of faith for science. The "missing link" notion is based, in part,

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on the teleological "Great Chain of Being" concept which views evolution as a ladder with man on the top rung. Evolution is more properly visualized, of course, as a great branching tree with large and small limbs . . . some of which are naturally closer to the tree trunk than others. Our inability to see a part of a particular branch doesn't mean that we assume that it's not attached to the tree. We merely continue our search from different perspectives until all parts of the branches can be seen clearly. Nothing is thought to be "missing" from the tree, even when only the terminal twigs (some of which are very old) are visible. New techniques are developed, dating methods are made more precise, new fossils are found—the exact pattern of branching on the tree changes with each bit of data, but the tree still stands firm. And man has no more "right" to the top of the tree than the cockroach.

But if the "Big Picture" is so simple, so straightforward, so well supported, why then isn't it a fundamental part of our cultural heritage?

The Shadow of Scopes. That sweat-stained battle between Clarence Darrow and William Jennings Bryan may well be but a colorful part of Americana, yet the spirit of the Scopes case, the famous 1925 Tennessee "Monkey Trial," lingers on in our classrooms and on our street corners. Scopes, after all, lost his case, and the shadow of Scopes still falls upon this country's biologists—if nothing else, it makes the scientists more timid than they ought to be. Almost 120 years after the publication of *Origin of Species*, there should be as little debate about whether evolution occurs by means of natural selection as there is about whether the Earth moves. Unfortunately, while Galileo is acceptable to all, Darwin is not. Much of introductory biological teaching is still taxonomic . . . students are not asked to think about broad evolutionary concepts . . . the pieces-of-frog, bits-of-life, jars-of-formalin approach avoids controversy. The "theory of special creation" section of West Virginia public school textbooks—1978 biology texts, mind you—offers ample testimony for the degree to which the specter of Scopes still haunts the country. (Testimony for the constitutional guarantee of separation of Church and State would seem somewhat more in doubt.)

Most colleges and universities these days offer courses in Poet's Physics, Chemistry for Nonmajors, Excursions in Mathematics. Courses, in other words, which recognize the basic cultural impact of the physical sciences, and endeavor to maintain the general concepts of those fields as a part of a well-rounded education (the original meaning, in fact, of "liberal arts"). But what of the biosciences? The trend, unfortunately, has been just the reverse—a tendency to go more and more microscopic, a tendency to lose sight of the forest through the pine needles. Thus, many contemporary college graduates know far more about

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the differences between RNA and DNA than they know about the similarities between dogs and cats! Granted, some teachers (and more influentially, some textbook publishers) have resisted the trend, but theirs is a quiet, oft lonely stuggle.

The timidity of biological educators is but one factor at the root of society's biological ignorance, of course. The relatively rapid urbanization of the American population must also share part of the blame. Most people no longer have a "Hands on" feeling for selective breeding, hybridization, ecological interaction, or any other "proof" of evolution. The farmers of Darwin's day, active as they were in practical animal husbandry, found little of surprise in *Origin of Species*. Farmers, after all, were one source of Darwin's data. But, now that "you can't keep the boys down on the farm," experience with biological principles has become quite remote.

Biological ignorance is all too pervasive, it creeps out of Grade B horror movies, it fills the public airwaves, it invades city council meetings and scientific societies. TV housewives do battle with "germs" every day, but "germs" are as obsolete as phlogiston. Granted, the phlogiston theory was a perfectly acceptable explanation for combustion prior to Lavoisier's discovery of oxygen, but today's ads for smoke detectors seem to manage fine without mention of phlogiston. Why then does the smiling TV matron—whether with mouthwash, toilet cleaner, or aerosol spray—do daily battle

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with "germs?" Van Leeuwenhoek may have been happy with "germs" when he first spied little wigglers in a water drop, but over 250 years later, the TV housewife ought to be attacking bacteria (if those aerosol sprays are making a dent in viruses, the pharmaceutical companies would be most interested). A rose by any other name does not smell as sweet—especially when the other name is misleading.

The Laetrile fraud is yet another recent manifestation of biological ignorance, and the advocates of a "cancer cure" from apricot pits threaten great harm to society. Consider an equally fraudulent idea from the world of automotive physical chemistry—the notion that water may be added to gasoline for improved gas mileage and lower pollution. The water injector has appeared as a miracle product from time to time, but sales of such "miracle" devices have never been very high. The "gut feeling" of most people, based on some understanding of chemistry and physics, simply leads to disbelief. And, certainly no national organizations have ever been formed in the half-century or so that such water injectors have been "reinvented," no powerful lobby groups have organized to demand freedom of choice over what can be ingested by their cars. Why then such emotionalism over Laetrile?

Ironically, there is a scientific basis for the automotive water injector. Under certain circumstances, the idea not only works, but it's absolutely necessary. The first turbocharged airplane engines, as well as later turbocharging attempts in various racing cars, needed water injection to avoid explosive detonation. More recent approaches to engine turbocharging have not required the addition of water, and of course, the normal Detroit product has nothing to gain, and much to lose from a mix of H_2O and gasoline. In a physics-oriented society, the miracle water injector won't sell, but biological frauds are not as readily recognized. Protective legislation was, and still is, necessary to spare people from the snake oil peddlers, and it is such legislation that the Laetrile Luddites (and the Saccharin Suckers) are attempting to destroy.

Vocal minorities have often played a decisive role in shaping legislative change, but rarely do such groups change laws in the direction of greater ignorance. And when the very nature of scientific fact is altered to whim in children's textbooks, the whole society suffers.

Living with Evolution. Evolution is a process, change is continuous. Even in the face of some biological understanding, however, misconceptions abound. There are no "rules" about what can and what cannot evolve through the random action of selective forces, and the only "rules" about artificial selection are wholly man-made. One of the many specious arguments often promoted by those who would substitute personal beliefs for science concerns the complexity and marvelous efficiency of the vertebrate (or

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human) eye. The "reasoning" of these biological critics maintains that eyes, with impressive wavelength, intensity, and psychophysical parameters, could never have developed without conscious (i.e., teleological, nonrandom) direction. The evidence for evolutionary "intermediate stages" is quite clear, of course. One has only to shine a flashlight on an earthworm to illustrate the basis of all eyes—photosensitive skin patches. Almost all nervous system tissue, and most sense organs, are merely specialized pieces of skin in terms of both phenotypic (individual) and genotypic (evolutionary) development. The human eye is basically a piece of worm skin that fell into a hole for better depth-of-field focusing, and gained a few important refinements and protective mechanisms over a couple hundred million years. Purely random, pure natural selection . . . those in each generation who could "see" best ate more and got eaten less.

Often, those who are perfectly willing to accept the generality of biological principles balk at any consideration of man's natural heritage, and this extremely anthropocentric viewpoint generates further confusion. For, just as it is impossible for the "Snipes" of the "Gnurg star system" to mutate before our eyes (since mutation only occurs in the chromosomes of individual cells), our neighbors don't evolve before our eyes either. Contemporary *Homo sapiens* has been around for less than a million years, and even though we still share a lot of DNA strands with our ancestral Australopithecine "ape-men," human evolution is not a highly visible process. As with all other species, however, man is still subject to the laws of biology, and is, perhaps (we haven't been able to ask the dolphins yet) the only species on this planet that is aware of, and able to direct, its evolution. One of the difficulties, of course, in visualizing human evolution arises from attempts at separating biological factors from sociocultural influences. Since man's capacity for culture, man's use of symbolic language, is but a part of our hominid heritage, this difficulty is not as great as it might appear to be.

Consider the incidence of rickets (lack of Vitamin D) or sickle-cell anemia among people of Negroid heritage who live in northern temperate zone areas (e.g., Chicago). Both of these medical problems have decreased over the last few centuries, although the rickets problem was much greater in the 19th century than it is now or was before the 19th century. In both cases, better diet and better medical care (those sociocultural influences) have undoubtedly contributed to a reduction in these diseases among blacks. It is equally apparent, however, that natural selection has played an important role in northern-dwelling black populations as well. In tropical climates, sickle-cell anemia—as a genetically recessive condition—confers a selective advantage on the individual in the form of malaria resistance. Also, in a southern climate, highly-pigmented skin minimizes the damaging effects of solar UV radiation. For black popu-

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lations which relocated in northern climes, however (sorry Australians, I mean temperate zones), both of these selective advantages became useless—if not harmful—and began to evolve out of the population. One factor in these changes was certainly the inbreeding with other North American racial groups. (Those who find inbreeding distasteful for some reason would do well to discontinue eating bread and corn—modern cereal grains would not exist without extensive hybridization.)

Of course, there is no reason to single out one racial group for examples of ongoing human evolution. From a strictly scientific standpoint, it would have been helpful if some entity had transplanted thousands of . . . oh, let's say . . . Swedes to North Africa several centuries ago. Then, we might also see some selective changes against the original advantages of low-pigmented skin. As it is, the data on incidence of skin cancer for Caucasians who moved south are quite illustrative.

Confusion about the *nature* of man leads even scientists astray . . . as the current sterile debate over the heritability of "intelligence" demonstrates. Both athletic prowess, and performance on standardized aptitude tests, are complex behavioral patterns. Any argument about the heritability of one complex behavior must apply to any other behavioral repertoire. How some can assert that "intelligence" (pick a definition) is more (or less) subject to hereditary influences, than is athletic performance, is not only puzzling, it's biological ignorance. No one would expect a Triple Crown winner—no matter what the breeding history—without the proper *training,* and the same holds true for human Olympic medalists. Why then, surprise at differences in human "intelligence," and the erroneous assumption that the small differences between groups are entirely genetic? Only when the *training* has been shown to be wholly equivalent, can we even begin to ask questions about the population genetics of "intelligence." And given that, what will we discover beyond Darwin's Fact Three: there is variation in all species.

Tampering with Evolution. The lack of a "hands on" appreciation, the absence of a "gut level" understanding, of biological principles has often led to a "if man was meant to fly, he'd have jet engines" attitude toward biological progress. Thus, the hue and cry about "tampering with evolution" is currently being directed at the work of molecular biologists.

The breeders of Seattle Slew hardly worried about tampering with evolution, yet they most certainly did. Every time a person steps on *this* blade of grass, and not *that* blade, he has tampered with evolution. Every duck hunter who accurately fires his shotgun has modified natural selection. Every otherwise-fertile woman on the infamous Pill has trifled with differential survival. Let's be serious, what is the difference between the artificial

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selection for a winning thoroughbred . . . for more beef on the hoof . . . and the artificial manipulation of the DNA in the nucleus of an intestinal bacteria? The difference, if any, is one of precision, one of progress—not, as some would have us believe, a qualitative leap into an invidious Pandora's Box. It's simply a matter of proper perspective, of putting recombinant DNA research into the "Big Picture." Those opposed to "new forms of life" should undergo a thorough self-analysis of their own "roots." Since prehistoric times, man has created countless new forms of life, and current recombinant DNA techniques are merely refinements that open the way for useful contributions of biotechnology—contributions of great potential benefit to our species and our planet.

The world's bioscientists have done an unprecedented thing. They have organized a searching consideration of the ethical implications of molecular biology . . . of gene splitting and splicing . . . *before* they have done the experiments! For such foresight and social responsibility, biologists should be highly praised, not pictured as mad scientists with microscopic monsters. Now that the problems have been weighed, let's leave the researchers alone to do their work. Laws which attempt to regulate thought have a rather poor record in human history, and legislative restrictions on scientific research are not thought-provoking.

One should not have to be kicked by a horse . . . to actually feel that sharp weighted sap at the end of a long lever-arm . . . to appreciate the selective advantage of the extant quadruped's hoof over the four and three toes of *Eohippus*, the horse's distant ancestor. Unfortunately, bits and pieces of biological knowledge often come like a kick in the pants—especially in today's climate of revolutionary developments. While there are no rules about how close a work of scientifically-inspired fiction should be to known science, the fiction should be at least inspire insight . . . not ignorance. Only with better understanding, only with a clearer view of the "Big Picture," may we hope to see—unlike the "Snipes of Gnurg"—our world undergo a gentle metamorphosis before our eyes.

DEAN R. LAMBE was born on Halloween in 1943. An honors graduate of Whitman College, Lambe (a two-syllable Finnish surname, by the way) received his doctorate in Biological Psychology from Duke University—and learned more than he ever wanted to know about parapsychology in the process. After many years in research and teaching at a midwestern liberal arts college, he became one of the few people thrown out of academia because he *did* finish his PhD. Lambe has since turned to full-time writing. Dr. Lambe currently shares a quiet corner of Southeastern Ohio with four ladies—a lawyer, a dachshund, and two Porsches—and is married to all of them. ■

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The Bard Laureate—younger and more steely of fiber than most Laureates—was nearly asleep on the padded recliner, behind the flower-massed rail of the convex balcony—dozing in the sunlight like a lazy, arrogant tiger.

The whir of a body-copter—the menace of a hovering shadow—roused him. He curled off the recliner and dove through the bright blossoms toward the Lec-Trigg aiming at him.

His attacker was slow—had too many factors to handle at once. Body-copting in cross-drafts of a crystal-faceted hive-city was not for the un-Licensed. Even as he dove, the Bard saw with contempt that the Messenger-uniformed man was out of balance—had come too near, intent on sighting fast through the flowers. The whirring copter-blade rose perilously close to the balcony awning—the man's boots dangled helplessly above the landing grid. He made a panicky grab for the rail—

A stranger to me, by Homer! reflected the Bard. *How dare a stranger breach these walls?*

He rammed a fist into the attacker's chest, between the copter braces. The blow lifted the man outwards and upwards—shattered the thin copter-blade against the aluminum awning frame.

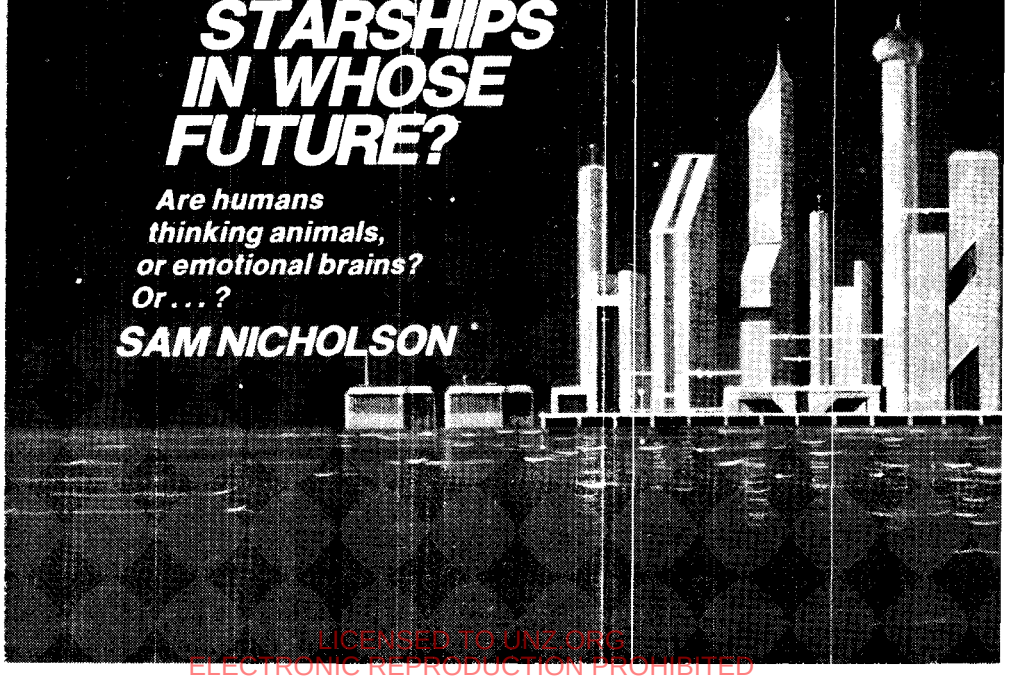
Falling, the attacker clutched at the balcony. The Lec-Trigg dropped into the flowers. His boots struck the landing grid—

The No Fault criminal law being

STARSHIPS IN WHOSE FUTURE?

Are humans thinking animals, or emotional brains? Or . . . ?

SAM NICHOLSON



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what it was, the Bard had no choice. He drove another short, solid blow against the man's chest. With a choked sob the attacker fell backwards

And fell and fell and fell—one hundred forty-four stories from the south tip of the star-patterned hive—dwindled to a dot that disappeared into the blue waters over the Manhattan reef.

The Bard witnessed in silence. His seething mind was a crucible of words . . .

Yes, DIE—thou wretch that wouldst these cleanly hands

Encarmine with a reciprocity of guilt!

Must I a helpless mirror be, of THY hate? . . .

A century ago, before the Glacial Melt, thought the Bard, the body would have fallen onto what was then called Battery Park. Most of Manhattan was now under the sea, a rock foundation for the gigantic pillars of the crystal hives.

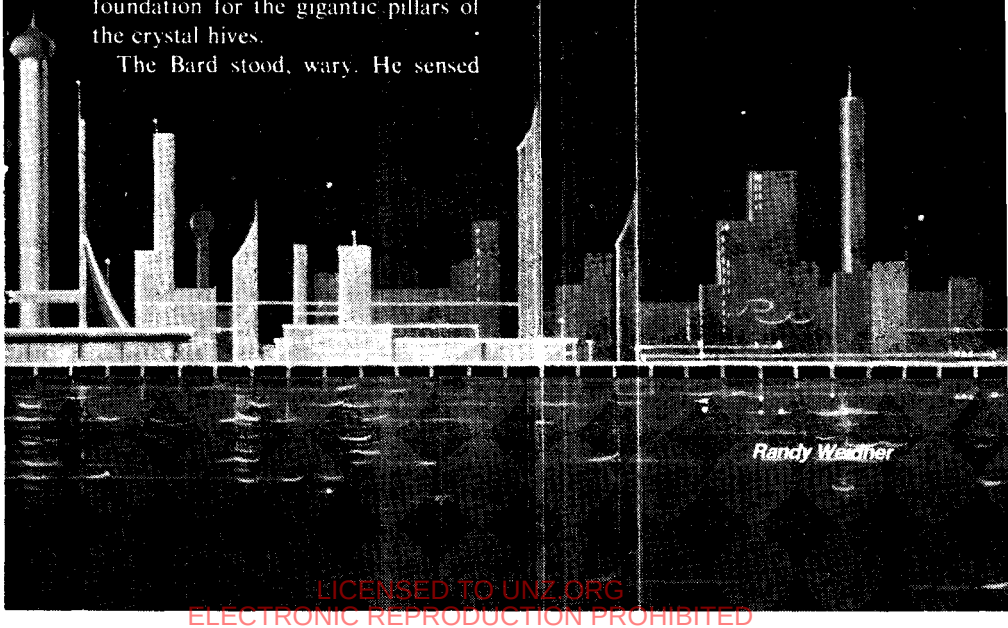
The Bard stood, wary. He sensed there might be watchers along the facet-clustered arm of the star. The residence cubicles curved convexly within each cluster like Theater Rotunda boxes. Nobody knew better than the Bard poet/playwright/thespian—the feel of watching eyes.

He dared not be seen picking up the stiletto-barreled Lee-Trigg. Making a play of examining the damage to the balcony, he dislodged the Lee-Trigg and kicked it beneath the recliner.

He slid the glass wall aside and entered his residence. He went to the DM-phone in his work area, disengaged the receiving tape and tactiled a number.

Another tape answered him, "Emergency Service. State identity, address, emergency, in twenty five seconds from—now."

The Bard reverted to prose. "Vardos Vayan, Bard Laureate. Address 180° South Battery, residence 14401. Reporting fatal body-copter accident.



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Messenger fumbled steering on approach to balcony grid. Rescue snatch failed."

He clicked off the instrument and re-engaged the tape. Did he show marks of a struggle? His thin summer jumpsuit was still immaculately white. His strong knuckles showed no abrasion.

The attack was not, perhaps, remarkable in itself. A bard/Thespian usually was not recruited as a Guardian, but he had accepted the honor of the Security post and doubtless had trod on more than a few toes during his engagement/watch at the stellar launching track atop jet-stream-whipped Mount Dhaulagiri.

The timing of the attack had been remarkable. The Bard had learned never to repeat a routine—never to take the same flyover to a theater or DM studio—never to eat twice in the same public restaurant—never to step onto his balcony, which he kept furnished for guests. Quite by chance on that afternoon had he been lulled by sun and sea.

Therefore, somebody had been watching—patient eyes behind the glittering cluster facets. The bogus Messenger had been on a standby, waiting for the signal.

His anger cooled to the frustration of interrupted genius. He paced the carpet, trying to grasp the thought that his dozing brain had been weaving into a drama line about pre-Melt Earth.

The entrance chimes rang. He moved to his desk and activated the door-viewer. He saw a young woman of physically perfect proportions and scanty silver-gauze shorts and yoke. She had a fashionably blank face, wet-red lips, black eyebrows, silver lashes and smooth-cap dark hair.

Did he know her? She seemed familiar—but he met so many fashionably blank young women—so many shadows that meant nothing.

Yet the girl reminded him of—what? Perhaps only of the drama theme he had been cerebrating—that the twentieth century humans had been out of phase with their creations—a time-slip—a continuum-jog.

He paused to scribble symbols on his writing pad. Then he considered whether he would admit her. She carried no album or recorder—and certainly concealed nothing under the gauze. He pressed the admittance key.

The door slid aside, and she stepped into the marble-tiled foyer. The weapon-detecting wall-embossings did not react. The filagree gate swung back, and she walked into the residence.

The Bard watched her approach and said, "Yes?"

She smiled, irony glistening from her lips. "You don't know me—of course."

"You speak 'of course' as if it were a bitter challenge. I'm a busy man without time to know many people. Of course. Who are you?"

"Many people. Among them, a neighbor." She paused. "You weren't hurt in the—attack?"

"In the accident, sweet neighbor,"

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he corrected softly. "In the accident."

The silver-fringed eyes opened wider. The girl had not expected him to evade the No Fault criminal law. He reflected that it had been stupid of her to come—but overall intelligence had sunk during the past century.

It was as if the Glacial Melt had wiped out an important genetic factor. The lowland, seaside cities had been the commercial and cultural centers. For millennia there had been a brain-drain from the inland towns to the coasts. The hill-dwellers had been herders, agriculturists. They were more passive, more naive, shallower and narrowly shrewd.

Since the Melt, the world had been emptier and better-fed. People were handsomer—but softer, duller. A handful of the cultural/scientific survivors had rebuilt the drowned cities into pillared, crystal-shaped hives—had improved the nuclear-cartridge engine—had built Space Waystations—had reached Proxima Centauri.

This handful had worked more quickly and efficiently, perhaps, without their pre-Melt opponents. When the oil rigs disintegrated under pounding surf—and the oil cartels with them—the way lay clear for solar power.

Generally, he reflected, the new world was a better place. On the debit side, there were too many "slow" brains, like this girl who had laid a trap and was now ambling into it to find out what had gone wrong.

She walked past him and stepped onto the balcony. He followed her, puzzled. She looked curiously at his shredded awning—and spread the flower masses apart with her hands. "Where's the Lec-Trigg?"

He addressed an invisible audience. "By Avon! The lady doth of Lec-Triggs dream."

"You dared to throw it over the rail." The irony was again on her wet-red lips. "You *had* to throw it away—of course."

"Lady, your bitterness *rails* in vain against my total noncomprehension."

"What *do* you comprehend—except *words, words, words*—" She caught herself—but too late.

The Bard smiled. "Yes, you stepped out of character when you quoted *the* Bard. By Polonius, you must be a fellow-thespian. And yet I don't know you?"

Her face had resumed its fashionable blankness, but an ironical *of course* hung in the air. The Bard went on, "Unbidden guests are not always unwelcome." He gestured to the inside of the residence. "Will you share a carafe of Waystation One grape?"

She preceded him from the balcony and, with the physical grace of her post-Melt kind, glided into the planter-ringed conversation circle and sank into a pedestal chair. The rose-tan of the gossamer curtains shaded her face and blotted out the silver eye-fringe. As if a veil had been lifted her eyes shone with their natural quality.

As he had suspected, they were very intelligent eyes, and the Bard felt his

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pulse quicken immediately.

He went to the wall cabinet, took down a flagon of grape, half-filled a carafe and brought carafe and long-stemmed goblets into the circle.

"You called Emergency? The copter-squad isn't here yet," commented the girl, naively stating the obvious.

Had the rose-tan shadow played a trick? He dared not look. He set the goblets on the low marble table and poured the glowing purple liquid. He was now intensely interested in finding out who she might be—but had lost the initiative.

He wondered with cold amusement which of them had the most difficult role—the girl, playing dumb—or himself, playing himself.

He handed her a goblet and replied to her comment, "The copter squads take their time about—accidents."

She sipped the drink as if she had tasted it before, not remarking upon its tingling flavor. It was not alcoholic but shimmered with the piquancy of fruit grown hydroponically in the slag basins of the Asteroid Belt. The silica flagons were an export item from the sand-bright little planet Vesta, which was booming within its air-bubble cities, even without the revenue from Waystation One.

The girl's silence was too concentrated. He reviewed his own actions. Had he, also, slipped out of character? If a real Licensed Messenger had fallen in a real accident—

He was conscious of a chill under the porous fabric covering his arms. He murmured, "Excuse me a moment," walked to his work area and reactivated his phone. He tactiled another number and got another tape: "Northeast Messengers. May we help you?"

"This is Vardos Vayan, Bard Laureate," he said. "A few moments ago a copter-Messenger fell most tragically from my balcony."

As the Bard returned to his chair, he saw that the girl was looking into her goblet, her silver lashes once more veiling her eyes.

She had made a mistake, taking the grape for granted, sipping it almost absentmindedly. Not only was she accustomed to the exotic, radiant taste—she did not give a groat about the status.

He wanted to make her walk through her role again—to alter the reading. Her blank face should have emoted surprise, simpleminded pleasure. Yet she was very good for an apprentice. Or was she, perhaps, more than an apprentice? She obviously was angry because he had not known her—yet her bitterness seemed too deep for mere conceit.

A whir of body-copters. The Bard glanced to the balcony and saw that two squadmen were arriving with practiced skill—the angled swoop, the blade cutoff, the neat drop to the landing grid. The men swung over the rail, unstrapped their copter harnesses, stowed them carefully on the recliner, and rapped on the glass wall beside the open panel.

"Come in, sergeant—patrolman—" said the Bard, rising to meet them.

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They trooped over the carpet as if conscious of their boots. The patrolman almost apologetically took out his recorder. The sergeant began, "Sorry, Bard Laureate, to interrupt you and your guest—"

He stopped, stared at the girl and stammered, "Hey, you're Penelope Plum!"

The patrolman supplemented, "The Star Penny—the Sugar Plum—!"

Penelope Plum! The planet's star comedienne! The Bard felt like a fool—yet felt, also, that his ignorance had a valid excuse. He was too busy within his own field to waste time on totally unrelated Comedy. How could he have known her from media pictures—when all women now were blank-faced and wet-lipped?

Penelope had set down her goblet and was grinning with simpleminded pleasure. "Did you see this season's Comedy Follies?"

"Twice," said the sergeant.

"Stood in line three hours," beamed the patrolman. "Gosh, the show was a riot from beginning to end."

The Bard's blood pressure rose. Not only had this female clown conspired to kill him—she was upstaging him in his own residence! He cleared his throat.

Immediately the sergeant added, "Your stuff is great, too, Bard Laureate. Great drama. I never miss it on DM."

"It's in a great slot," added the patrolman generously, "right before the Game of The Month."

"That's—great," managed the Bard. "Will you join us—?"

The sergeant brought the meeting to order. "Thanks—but we're on duty. About this accident—"

"It happened so quickly, I can't tell you much," frowned the Bard. "I was asleep on the balcony recliner—was wakened by the copter-whir—saw the Messenger coming in, too near and too high—jumped up—saw his blade snap—grabbed for him—"

"Lucky the blade didn't cut you in half," said the sergeant.

The Bard nodded. He had been too involved in countering the attack to think about the fallout.

"Did you phone Northeast?" was the sergeant's next question.

The girl answered smoothly and swiftly, "After he had calculated his reactions, yes."

There was an embarrassed pause. The squadmen stood silent.

The Bard mentally cursed Penelope Plum. While he had been criticizing the girl's reading of her role, she had zeroed in on his own lapse and was using it to make him look inhuman.

He said with dignity, "The delay came from shock. I don't take death lightly."

"You don't take anything lightly," retorted the girl. The patrolman sniggered.

Despite his inner fuming, the Bard had to admire Penelope's cleverness.

The sergeant returned to the matter at hand. "Did you receive a reply from Northeast?"

"I don't know. I haven't played back my tape."

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"We'll order a direct call."

The sergeant strode to the phone, disengaged the tape, tactiled his official code and said, "Break in on Northeast Messengers *re* a South Battery accident . . . Yeah, I'll hold."

Another pause. The patrolman glanced at his sergeant's averted head and asked the girl, "Are you gonna play the Proxima circuit again?"

"Not while I can fill Theater Rotundas on Earth," was her even reply. "The Waystation circuit is for hasbeens. I spent my first sixteen years out there with my old man—and believe, the Waystations are the boondocks!"

The patrolman laughed. The Bard realized that the girl's familiarity with Waystation One grape was a natural result of her space-trouping. He tried to assemble what his mind had filed about her background. His own twelve years on the Proxima circuit had created a gap in his Earth knowledge, but he could recall from his boyhood a vulgar slapstick act called Plum And His Plumbers. He had wondered why it had vanished so abruptly. Apparently it had traveled the entertainment-hungry Proxima circuit—and a newborn child had grown to maturity in space. Plum must still have been playing the Waystations during the Bard's Proxima tour. Of course, they had been on different levels.

The sergeant came back to them, his face grim. "No Northeast Messenger was here, Bard Laureate—no message."

The Bard hoped his surprise looked genuine. He commented, "So that's why the fellow was so clumsy!"

"You have No Fault liability insurance, Bard Laureate?"

"Of course. But how would it apply here?"

"Bard Laureate, you are definitely an Attractive Nuisance and under the No Fault crime laws are especially liable. If the deceased accident victim committed illegal acts in order to communicate with you, you are reciprocally his accomplice."

The Bard interrupted, "There's no proof he wanted me, specifically. However, since I'm insured, the insurance company can haggle over the No Fault hairsplitting."

The girl's sweet but cutting voice spoke again, "How fortunate that the visitor attempted no crime! The penalty for being a Contributory Victim is severe! Are you sure you've given nobody cause to hate you, Bard Laureate?"

"I swear I've *intended* no cause for hatred, Maid Plum."

"If we could have your insurance data—" said the sergeant.

The Bard gave the data. The squadmen once more refused refreshment, and left the residence. After they had whirred away, the Bard asked the girl, "How have I deserved your hate, Penelope?"

"How have *we* deserved your contempt, Bard Laureate?"

"Who are *we*?"

"Must you even ask? Is the stage all your world?"

Had the post-Melt levels become a

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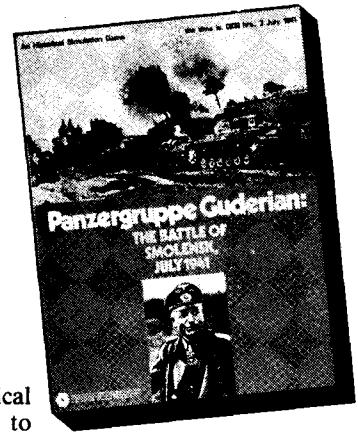

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polarization? The intelligent Star-thinkers vs. the duller masses? Why was the clever Penelope aligning herself with the dullards?

After a moment he said, "The Waystations are *not* the boondocks—they're the future."

"Whose future?"

"I don't understand."

She rose from her chair. "No. You're an intellectual idiot. You have fantastic talents—and no judgment. Your undoubted power to influence opinion makes you a Contributory Victim."

He repeated, "I don't understand. I'm an honest craftsman."

"Then by all means continue laying honest paving stones to hell."

It was a stunning exit-line, and she used it to carry her past the filagree gate and out of the residence.

He worked at his desk for the rest of the afternoon, laboring on a Prologue for his twentieth century time-slip drama. His audiences expected strong, verbally exciting Prologues, not an adjective spared. That accursed clown Penelope Plum could bring down the house with a pratfall, but the Bard Laureate was not let off so easily.

He scribbled, "Oh, Century of damned and dreaming men—"

He liked the alliteration but reflected that all centuries had damned and dreaming men.

The entrance chimes roused him to the long twilight and the recollection that he had invited his manager, George Apfelstein, for a working supper. He activated the door-viewer and saw that the visitor was indeed George, a slim-built elegant figure now tending to a middle-aged plumpness camouflaged behind high, flaring collars and pleated cummerbunds.

Many drama and poetry critics had said that Apfelstein had "made" Vardos Vayan into the planet's Bard Laureate. The Bard never denied or even inwardly resented the statement. He was more than willing to let the details and directions rest upon George Apfelstein's modish shoulders.

He pressed the entrance key but stayed at his desk as Apfelstein sauntered into the residence. "Order us a meal, George," said the Bard absently. "My Prologue won't come together."

The manager went directly to the conversation area, opened a cabinet recess, activated a viewing screen and let the day's menu from the 180° South Battery food-center flip in review. He coded crisp-fried octopus (fresh-caught from the sparkling waters of the Manhattan reef), Allegheny salad, syllabub *Laminaria* and Andes coffee. He pressed the Hold-Receiving button on the tray slot, helped himself to a goblet of Waystation One grape and started over to the work area.

Catching sight of the balcony damage, he paused and asked, "What now?"

"Body-copter accident," said the Bard curtly. "Purely a Nuisance case. A No Fault insurance hassle."

Apfelstein sat in a swivel-lounger facing the desk and flipped the arm-

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board up to hold his goblet. "What's the theme of the new epic?"

The Bard felt a surge of enthusiasm. "Have you noticed, George, on going through the archives, how the man/environment synchronization went out of phase during the twentieth century?"

"Impossible. Man is by definition inseparable from his environment."

"Inseparable, but not synchronous. Look here—"

He activated the Dimensioner on the inner wall, and Apfelstein swiveled his lounger into viewing position. The glass panel lit up with ancient pictorial reproductions.

"Renaissance men and women," explained the Bard. "Note how their physical appearance, achieved through clothing styles, matched their environment—dwellings, furniture, public buildings and monuments—"

The old shadows flashed by.

"Next, the brief Empire period, classical, static. Note how the women's gowns—the men's sleek ensembles—are in phase with the buildings, monuments—"

"You're only dealing with one level, Vardos," interrupted his manager. "In all historical eras—less so in our own, of course—the continuum-rejects live in fairly consistent squalor."

The Bard retorted, "Mankind moves forward—or at any rate *moves*—through the efforts of creative-level people. Historical eras are recognizable only by creative-level achievements. A mud hut of 2180 BC is the same as a mud hut of 2180 AD, but the creative-level civilizations are vastly different.

"Here we have the Victorians," he continued, as photographs gave more poignant evidence than the earlier portraits. "Lace-and-ruffles—aspidistra-and-plush—gingerbread-and-gables—

"But now look at mankind in the late twentieth century. Look at his creations—"

The Dimensioner came to life with color and 3D movement. Land-based skyscrapers soared to the clouds with glass-and-steel spears.

"They could build, anyhow," commented Apfelstein.

"And could integrate their buildings," added the Bard, as the viewing panned to a circular, two-level shopping center with marble floors, wide escalators, well-planned shopping and rest areas, planted gardens and fountains.

He continued, "How would you imagine the inhabitants of this thoroughly beautiful physical scene? Superbly shaped? Clothed with exquisite taste? Watch!"

The next scene was a sporting event—a stadium of unimpeachable architecture. Twentieth century mankind filed out of the gates—round shouldered, potbellied, uncombed, sloppily clad in the most tasteless clothing mankind had yet devised—and with not even the pride or wit to conceal their physical ugliness. Bony, knock-kneed women in thigh-high skirts—or enormous blubbery women ballooning out of skin-tight shorts. Youth of both sexes in drab blue

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denim, like slaves or prisoners.

The Dimensioner split-viewed—on the one side, the breathlessly soaring buildings—on the other, the distasteful, prideless, ugly people who had thronged them.

"It was a time-slip, a continuum-jog," said the Bard. "The buildings had the perfection of Paradise—the people had the grossness of *Neanderthal.* Twentieth century man was a barbarian throwback."

The Dimensioner darkened. Apfelstein sipped his goblet and asked, "Your epic is going to explain the paradox?"

"It will argue that the genetic cycle slipped a cog."

"Heavy stuff, as usual?"

The Bard said impatiently, "Heavy stuff is what I'm expected to produce, with rich verbal tones. I can't get away with limericks."

"I know—and you're very colorful, very effective, Vardos. You're the heavy gun defending Star Travel and the drive outward to discover possible galactic life. Without you, the wave that got us to Proxima would have receded. But I keep thinking that one of those old classical characters—Cato or Socrates or somebody—was ridden outta town on a rail because people couldn't stand for him being right all the time."

"Aristides," murmured the Bard. He cerebrated this new idea. Was it a clue to Penelope Plum's irrational hate?

The tray-slot signal was dinging. Supper was arriving up the shaft. The Bard rose wearily from his chair. He said, "I want to view some tapes of Penelope Plum and the Comedy Follies. Can you get them delivered by Messenger while we eat?"

Apfelstein looked startled. "Yeah. Order a Messenger. I'll give him a note for Jellis at 24-Hour-Rental. What's the idea? *You* wouldn't walk around the block to see the Angel Gabriel get smacked by a custard pie, not even if he was blowing the Last Trump."

"I don't understand something, George. And," the Bard added, indicating the damaged balcony, "frankly, it's killing me."

"Yeah, I figured that 'accident' was no accident," said his manager morosely. "I shouldn't have let Security get their hooks into you. The No Fault risk is too high."

Star-glittery night had moved across the Manhattan hives before a Northeast Messenger delivered the Comedy Follies tapes. The hives themselves sparkled with a brilliance that could be seen from Moon orbit. Post-Melt people, with ubiquitous solar power, had become drunk on light.

The Bard cut his work-area glow to theater-dark as he fed the rented tapes into his Dimensioner.

"What are you looking for?" asked Apfelstein, settling again into the lounger.

"A clue to what is wrong with being right all the time," said the Bard. "A mathematician is hardly better-loved

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because he makes mistakes. A Dhaulagiri flight programmer receives no encores if he brakes a thousand-passenger starship against the mountain instead of against jet streams. What endearing mistakes is a Bard expected to make?"

He sat at his desk. Apfelstein commented, "You don't understand emotions, Vardos. You write drama, but you don't feel it."

"I create—I interpret—I empathize. What more do you expect of me?"

Apfelstein shrugged. "As your manager, nothing."

The Dimensioner glimmered into brilliant life as the Comedy Follies pranced and sang across the panel. The Bard saw at once that the production was lavish, faultless. The dancing was excellent in choreography, execution, costuming. The comedy sketches were fast-paced.

Personally, he responded to nothing except an occasional flash of original wit. The slapstick clowning bored and disgusted him. Yet he let the second tape proceed.

"Finding anything out?" asked his manager.

"Only that Penelope Plum is as exact a perfectionist as myself," muttered the Bard. "Not a wrong step, not a wrong gesture. Or are these performances retaped?"

"Nope. The Follies are taped live. What you see is what they played."

With the second tape the Bard began to get a clue, an inkling. He let the third tape run. As the Follies curtain came down, Apfelstein grumbled, "What about an intermission?"

The Bard laughed and blacked the Dimensioner. "You can go home, George."

"Nope. I want to hear your opinions of all this."

They took a ten-minute break and resumed. During the final three tapes, the Bard was watching only for the significant thread that tied the series together. It insinuated itself almost subliminally—touched a responsive chord in subconscious thoughts—brought audiences back time after time with no awareness of what had drawn them. "She's a riot," they grinned to each other, "a real Sugar Plum."

After the last tape had run through, Apfelstein coded the food computer for hybrid-fowl sandwiches and palm milk ice-shakes while the Bard paced the carpet. He keyed back the gossamer curtains and saw that the summer dawn was fading the far eastern horizon.

They sat down to their trays, and the Bard remarked, "Penelope Plum must have been a wretchedly unhappy child on the Proxima circuit. *That* much I understand."

"I knew her old man," said Apfelstein unexpectedly. "I was just out of Humanities Studies, running interference for a cousin who was a violin virtuoso needing a pushy type like me to bust down a few doors for him. Neither of us could live off the concert stipendium, so I began taking other clients."

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"Including me," smiled the Bard.

"Hell, this was long before your time. Twenty-some years ago. Plum had become unstuck from his Plumbers. He had no credit rating left—and to top off everything else, had got involved with a girl who subsequently presented him with Penelope and a bill for services rendered."

"And I suppose his No Fault insurance had run out."

Apfelstein brought his fist down on the marble table. "That's typical of your thinking, Vardos! If a girl handed you a baby—you should be so human!—you'd ring up your No Fault insurer.

"But Plum was a man with emotions. He didn't have a credit left—or a friend, either—but he had a tiny bit of life who was as cute twenty-some years ago as she is today. He couldn't afford to share her with her mother, so he stole her. He signed with the Proxima circuit—stowed Penelope in a carrier belonging to an accompanying act, Camden's Corny Canines, and smuggled her aboard a starship. They arrived at Vesta with a petition signed by every passenger on the starship that Plum be allowed to keep Penelope. The mother eventually agreed to a financial settlement, and Penelope grew up on the circuit."

He added, "As far as I've heard, she was *not* unhappy in space. She worshiped her father and joined his act as soon as she could toddle. An express tour of the Proxima circuit takes eleven years. The Plums were out there sixteen years, and Penelope didn't come home until Plum died of a heart attack on Waystation Two. If she'd been unhappy as a kid, Plum would have brought her home."

"Then something doesn't fit," frowned the Bard. "She's using her slapstick to undermine Star Travel—to destroy the Waystations—to force mankind back to Earth."

Apfelstein raised his eyebrows. "What—?"

"The comedy sketches. Always the bucolic Earth-lover against the robotic spaceman."

"Current-event satire. Always good for a laugh."

"It's not the *laughs* that worry me. A Proxima Wheel programmer who's never seen farm animals can get a kick from the rear end of a slapstick mule without there being any social significance in it. But all Penelope's sketches have an insidious needling about the *dangers* in space—danger to the human psyche—danger in the life forms we may encounter further out."

"There *was* general relief," said Apfelstein quickly, "that the Proxima planets were uninhabited. I was only a kid—four or five years old—when the Waystation Builders reached Proxima Three, but I can remember how thankful everybody was that the Proxima system was empty.

"You're taking this too seriously, Vardos," he went on. "Maybe Penny is milking the space theme, but what harm is she doing? Whenever a World Council decision looks a little uncertain, the space proponents buy satellite/network time for one of your stir-

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ring dramas, and the whole planet thrills to the grandeur of space achievement. When you play the lead in your *Waystation Trilogy*, nobody gives a thought to Penelope's robotic spacemen or galactic menaces."

The Bard stood up and faced the dawn. "Can that be enough reason—?

"Reason that Penelope Plum is trying to kill me. To *kill* me," he repeated, as if he could not believe what he was saying.

As soon as Apfelstein left the residence, the Bard attached his Security coder to his phone and made his report. He wondered how it would be received. Security might disregard the coincidence of Penelope's visit and the theme of her shows. She was (for a reason his intellect only grudgingly understood) a much-loved performer.

When he resumed work on his epic, after a short sleep, he postponed the Prologue while he puzzled over *emotions*. Nobody—as far as he knew—actively disliked him, but there was a reserve—a distance—in his human contacts. In a way, he supposed, he was treated as if he were a distinguished foreign official. He had accepted this role without thought—it saved time and bother—but now he was wondering if he wanted to remain foreign to his own species.

Or were there *two* species—the star travelers and the stay-at-homes? The Thinkers and the Dullards? The devastating genetic effect of the Glacial floods could not be discounted, but the floods were a century in the past. The Coast and the Highlands were interbreeding as before. There would always be levels in society, but on the new, uncrowded, well-fed Earth, there was no reason for one level to destroy another.

"You don't understand," Penelope had said. Apfelstein had advised, "Beware of always being right."

No, he did *not* understand—but he was a good craftsman. He appreciated the shrewdness of the Follies sketches, where all-too-human bucolics fumbled and slapsticked to their victories over the scientifically-trained spacemen.

Was Penelope's message that Emotion was superior to Intellect? Did she want the heart to rule the brain? If so, it was a stupid, fatal message. The defeat of space exploration would not mean a retreat to some idyllic heart-ruled pastoral world. It would mean a quickly overpopulated planet, with starvation and war, a chaos without a single unifying factor. The world had united to rebuild after the Melt, under the leadership of the free, technically superior West. Still free, the continents were uniting to go into space. It was space exploration that guaranteed freedom. No Earth tyranny could oppress colonies light-years away—and beyond those light-years was the future.

Penelope had asked, "Whose future?" He wanted to answer, "Everybody's future, *of course*." How could anyone misinterpret his dramas as assigning the future to any one level of Earthmen?

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Slowly, he understood. The only people who survived in space were *those who did not make mistakes.* Space was closed to the absentminded, the careless, the undisciplined, the lazy. His dramas had sloughed them off with implied condemnation, and they had reacted *emotionally.*

He had asked, "What have I done to deserve your hate?" And Penelope had countered, "What have *we* done to deserve your contempt?"

His new drama would have to correct that oversight by showing that the stay-at-homes were more secure, more free, *because* the star travelers were in space. To the damned and the dreaming, he would have to add—what? Apfelstein had called them continuum-rejects, but a bard had to soften them into more sympathetic images.

And a gifted perfectionist like Penelope Plum was their spokesman? The Bard shook his head and got down to his Prologue.

He had come as far as,

Oh, Century that burst away the cage

In which mankind had grown—had overgrown—

Had been pressed back to writhe with twisted limbs

And stifled lungs—o'er straining 'gainst the bars

That cruel confined him . . .,

when Security signals bypassed his phone tape. He attached his decoder and took the call.

Security was ordering him to give another series of preflight readings at Dhaulagiri. Passengers were assembling for the next Proxima run. Was there still danger of sabotage? Had he been attacked to keep him away from Dhaulagiri?

Even before the Melt, the impracticability of ground-based chemical rockets had been recognized. There had been a short trial of piggyback air-to-space vehicles, and a longer—and still current—use of atomic vehicles blasting from Moon orbit. Since the starship assembly and maintenance hangars were on the Moon, the mass of ordinary freight was collected there and transshipped in robot carriers, a direct Proxima flight taking 4.75 years. Freight was, in fact, shipped directly to the Waystation concerned, an a carrier blasted out of orbit every Earth day, mostly to the Proxima planets or to Vesta—and returned with payloads for Earth.

But the stumbling block to colonization was the economics of passenger travel. To pay its way, a passenger liner had to carry a thousand people and their luggage, plus in-flight personnel. For those making the Proxima journey, this meant enough clothes for 5.5 years along the circuit. Even in starships, shoes wear out and children grow up. Not to mention the infants born *en route*, for whom the starship had to stock the usual necessities. The post-Melt world, expanding into the Galaxy, welcomed children, who, in the process of genetic adjustment, came less frequently, now that the stabilized species had no need for frantic overproduction for survival.

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Passengers, however, were not freight. To ferry all this humanity to the Moon and restow them on a starship was logistically unfeasible. A passenger liner had to be stowed and boarded on Earth—and to be blasted off the Earth with atomic power.

By this time the vacuum/attraction chamber had been invented, to block and hold the radioactive blast-off cloud that otherwise would have polluted the atmosphere. The remaining problem was the G-factor. Passengers are not centrifuge-trained astronauts.

An engine geared to attain almost-light speed tends to take off rather fast. A vertical lift-off from Earth would smear the passengers against their recliners like peanut butter. So a horizontal launch complex had been developed, and had been built across (and into) the leveled peaks of Mount Dhaulagiri in the Himalayas. The atomic-cartridge engine accelerated off the guidance track against the 300 km/h jet streams, 8500 meters above the new sea level. When the starship emerged from the G-modifying cushion of the air streams, it had orbital velocity and was on its way.

The Bard would have preferred to report to Dhaulagiri alone, but George Apfelstein was worried about his client's safety—and the commercial waste of his talents.

"Preflight entertainment is old films and new tryouts," he grumbled. "You don't belong there."

"It's midsummer—the theater doldrums," smiled the Bard. "I'm resting anyhow."

An ordinary supersonic flight took them to the World Council Enclave at the base of Mount Dhaulagiri. The Enclave hotel was full of passengers awaiting—at World Council expense—the arrival of their liner from the Moon maintenance hangar.

The Bard remembered how he, too, had waited there—with the Joe Humber Thespian Company, the ink still fresh on his drama school diploma, and a new drama in his pocket. He had not been apprehensive about contracting for eleven years of one-night stands in space. He had thought of them as an eleven-year guarantee to act and write. By popular demand, the troupe had stayed a year among the Proxima planets. Joe Humber had piled up credits on that particular tour, and was still going strong.

Since Entertainers qualified as Personnel, the Bard left his manager in the hotel's cocktail lounge and was admitted to the passenger tube, which conveyed him to the launch complex topside in ten minutes. He emerged from his bucket seat into a concrete blockhouse, silent except for the hum of the air-pressurizer.

There were two exit tunnels. One was labeled, *To The Starship*, and was closed off by a gate. The other said, *Flight Personnel, Maintenance, Security.*

He followed this second tunnel to an elevator with a small slot instead of a call button. He placed his thumb against a plate in the slot. The plate slid aside. After a few seconds the elevator opened. The Bard entered,

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sent the cage to the Security level and walked into a small office with a wide viewport onto the launch field.

The man at the desk, clad in a blue-and-gold starship jumpsuit, rose and shook the Bard's hand. "Good of you to come, Bard Laureate," he said. "Please sit down."

The Bard sat down. "Anything specific disturbing you, Colonel?"

"Your report about Penelope Plum. Several weeks ago she volunteered for the preflight entertainment. She's arriving tomorrow."

The Bard glanced out of the viewport. The building was at the south side of the vast, leveled area, looking across the trackway. At this time there was nothing to be seen except banded patterns across the ground. Gusts of snow streaked horizontally from west to east.

"A good braking wind," commented the Bard. "Have they sent the ship from the Moon?"

"Yes. He's braking at forty kilometers. It's tricky—easing an empty ship into the atmosphere, revving her up to maneuvering speed and setting her down. The astronauts like to let her ride against the higher streams."

As he spoke, a red light went on beside the viewport. At the extreme edges of the trackway the patterns stirred and slid upward, becoming steel huts housing vehicles.

A city block with vast batwings seemed to be hanging in the eastern sky. It approached like a monster creeping to the mesa. Its caterpillar-track undercarriage touched down, rippled the length of the mesa, and stopped.

The Bard said impulsively, "I swear, the important genetic factor *is* intellect."

The colonel smiled a little. "Of course it's intellect. Who says it isn't?"

"Penelope Plum. She wants a cozy, comfortable world of hearts and flowers and custard pies."

The vehicles had trundled alongside the starship. Like tugboats they moved her astern, positioning her at the eastern end of the field. They retreated to their steel huts, which sank into the ground.

The starship undercarriage retracted, resting her on the ground. When she lifted again, before blast-off, she would be on a rising guidance track—but blast-off was a week away.

Behind her stern tubes a whole amphitheater was sprouting from the bowels of the mountain. It was the vacuum/attraction chamber that would catch her radioactive wake. Steel walls were rearing up to outline her, except for the narrow track at bow and stern—a windbreak with roots deeper than its invisible walls.

A whole mountain had been leveled off and tunneled out, for the machinery of this operation.

Flexible tubes were snaking out from the blockhouse to hatches in the steel wall.

"We've cut the loading of stores to four days," said the colonel. "The Waystations are supplying more and

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more of our food these days."

The Bard smiled, recalling that his own tour had included far too many months of space pemmican. He returned to the present and asked, "Why did Penelope Plum volunteer for preflight?"

"We didn't ask. We assumed she was trying out new talent or new routines. We don't look gift horses in the mouth. Do you think she's coming to attempt sabotage?"

The Bard thought it over. "No. I think she's coming because her antispace group failed in their previous sabotage attempt and have given up trying to break through your control/patrol techniques, which are idiot-proof, fail-safe—"

The Security man seemed doubtful. "Any automatic system can be sabotaged by superior technology."

"But superior technology is exactly what Penelope Plum can never achieve because she *feels emotionally* instead of *thinking rationally*. We wondered who was the prime mover of that attempt to infiltrate Personnel. The impersonator was an exact copy of the man who had been kidnapped—right down to his plastic fingerprints. We should have suspected a theater background, with expert coaching.

"And we also should have suspected an emotionally-oriented, antiscientific group, since the man gave himself away immediately by not having the technical knowledge necessary for his job. We could not understand who would *want* to use violence to stop the starships. World Council policy decisions don't engender that much heat.

"But everything is explained if we realize that antispace policy has become an emotional matter—from people lacking the personality or intellect to survive in space."

"Penelope Plum is a space-child—one of the most brilliant of our starship nurseries."

"I know. I find her antispace sketches incomprehensible. But I believe she is coming to carry on an *emotional* sabotage—to prey upon the latent fears of a thousand space-bound passengers. And in order that no last-minute antidote can be summoned, she sent a clumsy fool to kill me."

The colonel hesitated. "If you're right . . . God knows we can't risk space hysteria with a thousand passengers! We'll cancel her show."

"And have a whispering campaign in the hotel lounges instead of an open campaign in the dinner theater? I'd rather place our reliance on the fact that mankind is a *thinking* animal—or rather, *not an animal at all*!

"I know I have the reputation of being an aloof, cerebrating, unfeeling word-craftsman," he went on, "but one thing I *do* feel is the *glory* of our species—the marvel of our voyage to the stars. From his start on this planet, *Homo sapiens* has overcome a basically hostile environment and bent all natural forces to his purposes. He exists to strive and conquer. Nothing defeats him except boredom. Even when he's browsing knee-deep in clover, he thinks the far fields must be greener.

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"Although I believe that mankind advances through intellect, I don't see why the heart and the head should be an either/or proposition. If my dramas have made them appear so, maybe I lack judgment, as Penelope claims. I propose that we fight it out with our particular weapons, in the preflight entertainment."

The Colonel demurred. "You would be effective only if you closed the bill, and Penelope is a hard act to follow. You risk being an anticlimax to an audience too laughter-wrung to listen."

"I think I can top her. I *must* top her. We can't have the planet brainwashed back to the Stone Age," said the Bard. "The best counteroffensive is to beat Penelope at her own game, once and for all."

That evening, as they dined in their hotel suite, the Bard told his manager what he was planning to do.

"You're crazy, Vardos," said Apfelstein at once. "You don't know the tricks, the gimmicks. The girl will break up your act. She'll wipe the boards with you."

"George, after all, I'm a thespian—"

"You're a bard working with a company who respects your material. Penelope is no thespian. She's a clown—with sixteen years of coaching from her old man on every lousy, dirty—"

"All right—I consider myself duly warned. What lines should I give them?"

Apfelstein smoothed his wing-coiffure with both hands. "Your *Waystation*—but you can't drag that out for a week. I advise against the whole project."

Under his manager's worried eye, the Bard sat down to write new material. He could begin with his own journey into space—

Penelope Plum arrived the next afternoon with four members of her slapstick troupe. She was clad in black velvet tunic and hose, an adorable kitten with wet-cherry lips and silver lashes. When she saw the playbill in the hotel lobby, with *Bard Laureate* given star lettering, she drew a hissing little breath.

Apfelstein, watching her, groaned to himself, "Poor Vardos—it's murder—murder—"

That evening the dinner-show entertainment was opened by a song-and-dance duo. The starship passengers and other hotel guests, in a good mood and anticipating better treats, gave the duo a big hand.

The curtain closed on them—and opened on a stage made bleak by cave-painted backdrops. A single bucket seat was center stage, attached to a vertical pole. Beside the seat was the mock-up of a control panel. The audience stirred. They recognized the scene as representing the Dhaulagiri conveyor tube.

In the wings, the watching Bard also stirred. He muttered to Apfelstein, "She's changed from a needle to an ax. This will be rough."

"I told you so," said Apfelstein.

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Penelope, costumed as a winsome Raggedy Ann, made her entrance. She acknowledged the spattering of applause, then fearfully approached the bucket seat. She gazed upward, shuddered, began tiptoeing away. A flight attendant strode onto the stage, caught her, shook her, pinwheeled her and dumped her into the seat. Clever—even funny—acrobatics, but nobody laughed.

The attendant stood beside the control panel and pulled a lever. The seat, with the madly imploring Penelope, bounced up and down. More levers. The seat began to rise on the pole. Up—up—faster—faster. The attendant was crazily banging on the panel. The seat stopped—and slid down the pole like a lead plummet.

Panicky screams gusted from the audience—and the seat stopped a scant handsbreath from the stage. Penelope jounced and flopped. The Bard reflected that she must have felt the fall, despite the springs inside the seat. Again, she strove to escape. Again, she was caught and stuffed into the seat, which rose out of sight as a painted drop fell in front of it.

This drop was silvery, representing a starship salon. Two dining room waiters placed a table before it. They rushed on and off stage, setting the table to look like the pictures in the Proxima brochures. A shining white cloth, attractive plates, glasses, silverware. A vase of flowers. Penelope, still as Raggedy Ann, reeled dizzily onto the stage, sat at the table, held out an empty goblet.

A waiter carried two pails onto the stage. He blew into one pail, shook dust out of it, set it down, lifted the second pail and poured gray, greasy water out of it, slopping the filthy liquid into the first pail. He bent over, cupped his hand and scooped the scum from the water. Finally he poised the pail over Penelope's goblet and splashed water into it. She sniffed—held the goblet at arm's length.

"*Why*?" muttered the Bard, shocked. "She knows a starship's recycled water is absolutely pure! She knows the conveyor seats can't fall! She can't be allowed—!"

He took a stride—and was blocked by Apfelstein. "Cool down, Vardos. This was the way you wanted to play it. *You* were the one that allowed her. Now you have to let her do her worst."

Fast-paced, as all her sketches, the worst proceeded. Penelope was starved on space pemmican, marooned on a Wheel shuttle, captured by monsters who pursued her around the stage and joined her in a tuneful grand finale. Penelope was too smart to leave the audience in a black mood, but she had hammered home her point—*there's danger in space—we warm lovable clowns aren't wanted in space—it's cold out there.*

After her final bow, Penelope swept smugly past the Bard and disappeared into her dressing room.

The next act was a gymnast troupe, but they never had a chance. The audience was restless, rustling, whispering. The troupe's intricately coordinated

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pyramids got only scattered, perfunctory applause.

"She really frightened them, damn her," muttered the Bard. "They aren't *thinking*!"

His own music cued him, and he strode to center stage. He was clad in russet velvet doublet and hose, drab compared to the other acts, but he felt a sudden quiet beyond the footlights, a surge of hope that he would allay the fears Penelope had roused. He began, with a smile and a warm, confiding voice,

"*Good cheer! Let not your guts be watered weak*

By bogeymen and mindless play. The truth

Ye know, as well as I. Hold fast! And damned

Be malice that would fear-encrust our minds!"

He could sense the eager listening. His rich, glad voice went on, "*Twelve years I followed speed-of-light—*"

There was a crash among the tables a few rows back from the orchestra pit. A waiter had dropped a tray. Another waiter bustled over to him, pulling tablecloths to the carpet, knocking off the small table illuminators, falling over a girl who started wrestling him.

The Bard recognized Penelope. A titter of laughter ghosted around the Rotunda.

On two other tier levels "waiters" popped up among the tables. The Bard realized grimly that Penelope and her clowns would stop at nothing to silence him. He thundered,

"*Ye less-than-human Melt-brained devil's spawn!*

Think ye mankind will dumbly stray into

The hell-swamp of your false imaginings?"

Penelope, torn half-naked by the "wrestling," jumped upon the table, snatched a plate and spun it toward him. He ducked instinctively—but the other clowns were now bombarding the stage. Bread and fruit sailed over the footlights. A baked potato squashed messily against the Bard's forehead.

There was a gasp of awed horror—then spontaneous laughter.

A knife thudded into the Bard's doublet—and clattered to the stage. Women at the first-row tables began screaming.

The Bard threw a command to the orchestra—World Council Theme—and gestured to the curtain. He stepped back as cymbals clashed and red velvet folds swayed together in front of his face. With his foot he twitched the knife toward him, under the curtain hem.

Apfelstein ran onto the darkened stage. The Bard stooped, picked up the knife and said, "Quick—take this weapon and replace it with a property knife."

"Where—?"

"From Penelope's property trunk. She and her troupe are in the Rotunda."

"Are you hurt?"

"No." The Bard brushed his sleeve across his potato-smeared forehead.

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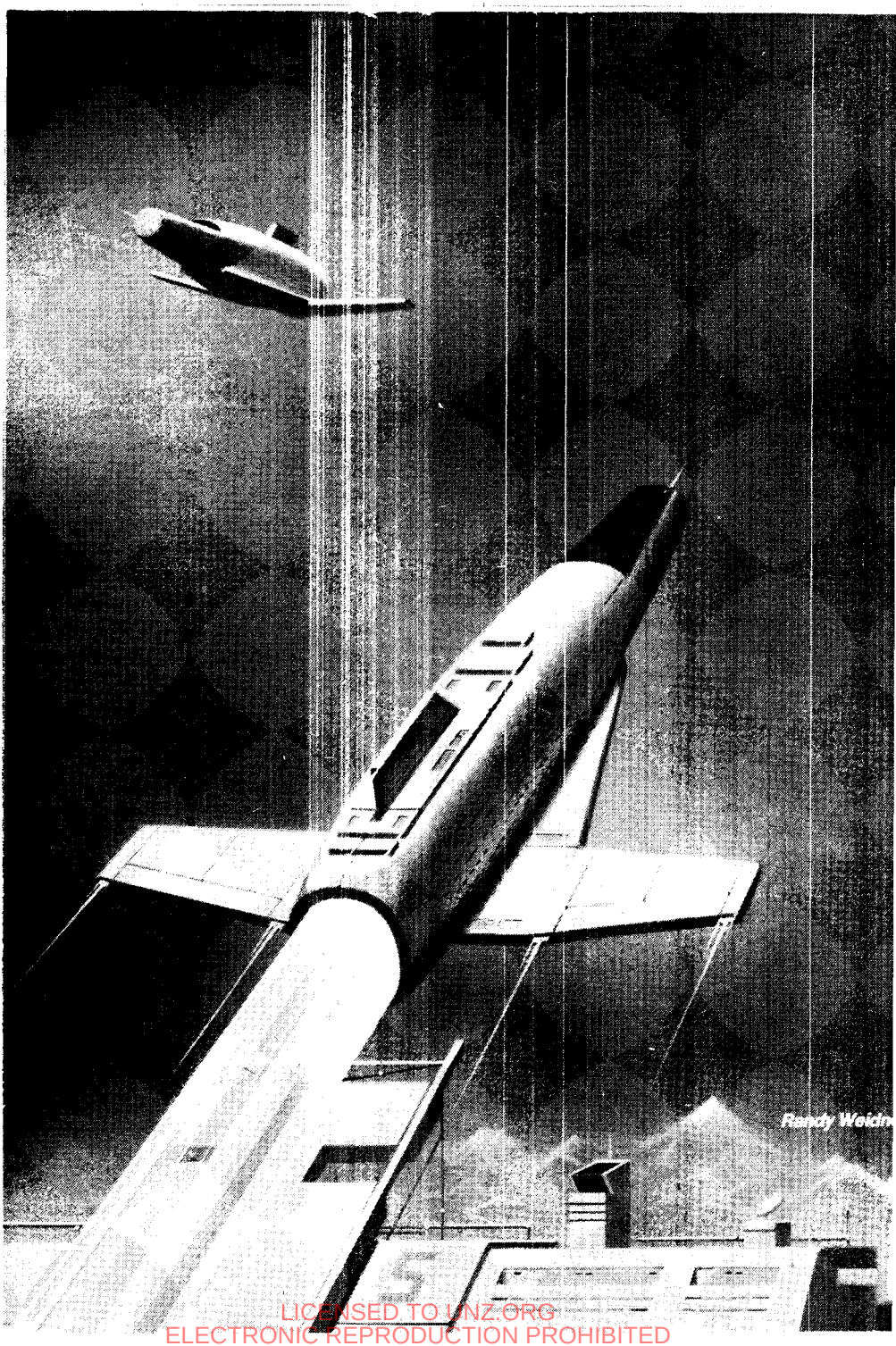

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"At least I had the wit to wear Security body armor."

Apfelstein edged the knife into his jacket pocket. "Now will you call off this crazy deal? I told you—"

"The *knife*, George! Ditch it!"

George hurried backstage.

The Bard stood in thought. He should have brought costumes! Could he get them sent to Dhaulagiri by tomorrow night? His *Waystation* roles—the Navigator—the Agronomist. And he would need the property Lec-Trigg—

George hurried back, breathless, and dropped an object to the stage. "Close timing, but I made it. The real knife is stashed behind some old flats that haven't been moved since the Melt."

The stage lights went on. A neatly uniformed man walked out to them. "Bard Laureate? World Council police. You were struck by a knife?"

"You mean—this?" asked Bard casually, nudging the object with his foot.

The policeman gingerly picked the knife up by the hilt. He stared—touched the blade. It flexed.

"A property knife," smiled the Bard. "Just part of the fun."

The policeman remained stubbornly unconvinced. "Are you telling me you ordered—?"

"Not I." The Bard restrained his impatience and said slowly, "Penelope Plum deciding to amuse the audience by breaking up my act—traditional slapstick clowning. While the gymnasts were performing, she and her troupe changed costumes and went into the Rotunda—"

"A knife—even a property knife—doesn't belong to that kind of horseplay. She should have known a knife would scare somebody! I'll have to arrest her for inducing a riot."

"Under No Fault, the witnesses who screamed were Contributor Inducers," the Bard reminded him.

He saw that Penelope had come onto the stage, still half-clad from her antics. She grinned like a merry imp and stuck her tongue out at him.

The policeman turned, saw her, and beckoned her over. She came with no hesitation and said to the Bard, "Couldn't hold your own against heckling, hey? Not with all your 'devil's spawn' and 'hell-swamp'. And you call yourself a thespian! Why, Dad would have—!"

She had caught sight of the property knife. Her eyes opened wide and her face went blank.

The policeman said, "Is this your knife?"

She took it from him. "Yes. See the 'Plum' on the hilt? Where did you find it?"

"On the stage, where it fell after striking the Bard."

For a moment she looked pale, stunned. Then she turned on the Bard. "You liar! You scheming—heartless—ruthless—*liar*!" As if beside herself with rage, she whirled from them and rushed backstage.

The policeman strode after her.

Apfelstein said, "She didn't know a knife was thrown. Somebody added

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murder to the act on his own."

"Murder was already in the act. *My* murder." The Bard thought for a moment. "Why should a mere knife upset her? She watched a man aim a Lec-Trigg at me and was coolly amused."

"Who can second-guess emotional conspirators? We should have left the real knife."

"For what purpose? To get me arrested for Contributory Murder? Let Penelope argue herself out of a No Fault riot."

Apfelstein sighed. "And I suppose we'll have more of the same, tomorrow night."

"Not quite. *You* are going to wangle my costumes aboard tomorrow's jet. And *I* am going to make a few arrangements. I, too, have played the no-holds-barred Proxima circuit!"

The next night saw a capacity house. Apfelstein fidgeted as the Bard made himself up in his dressing room. The Navigator costume, theatrically gold and glitter, metamorphosed the Bard into another person—dashing, heroic.

"The house is packed," said Apfelstein, "just waiting for her to make a fool of you again."

"She frightened them with shadows—and smashed their light," said the Bard. "They're waiting for me to lead them out of the dark."

He stood up, checked the charge in the property Lec-Trigg and holstered it.

The call boy's voice said. "Curtain time, Bard Laureate!"

The Bard gestured his manager to the door. "Come on—"

The song-and-dance duo was freezing to death in the cold suspense of the packed house. They finished their routine and exited to mechanical applause.

The curtain closed briefly and opened on a pastoral tableau. Penelope Plum, a pretty milkmaid, and her overalled troupe, were against a farm backdrop. The audience came to life and the sketch began.

"Tell me, Susie, is it true that Cousin Zeke's a-coming home from Proxima today?"

There was a nerve-jangling screech from the amplifiers, and the sound went dead. Penelope Plum was mouthing words that scarcely carried beyond the orchestra pit.

Apfelstein looked at the Bard. "You didn't—?"

"Didn't I?"

The amplifiers resumed, with an out-of-phase wobble that killed the dialogue. Penelope did not fight it. She jettisoned the sketch with a smile and gave a sign to the orchestra leader. Music boomed out—the amplifiers miraculously returning to normal—and she led her bucolics in a medley of popular songs.

It was good lilting entertainment. The audience asked for more and cheered her final encore. When the red velvet folds had closed in front of her, she zeroed in on the watching Bard.

"How dare you!" she began, in a

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low tense murmur. "That was outrageous!"

"By Hurok, the lady has a short memory!"

"But you're not fighting fair!" she protested. "You're not fighting slapstick with slapstick! You're lying and conniving! You're bringing hand grenades into a pillow fight!"

The curtain opened to a fanfare, and the gymnasts skipped past them. The Bard said quietly,

"Surely you don't expect me to fight murder with pillows!"

She vibrated with fury and whispered hoarsely, "*You're* the murderer! The man who came to your balcony meant you no harm—no *real* harm—and even if he had, he had dropped the weapon! You could have helped him to safety! If you had any heart—any feelings—you *would* have helped him! But you pushed him off the landing grid—you killed him like you'd kill a fly!"

"Should I have let him kill me, instead?"

She gave a sobbing laugh. "Kill you? With what? After all these years you didn't know a property Lec-Trigg when you saw one?"

The stage manager said, "Quiet, please!"

Penelope flounced away. The Bard felt numb, suddenly weighted by the costume, mummified by the greasepaint. George asked, "*Was* it a property Lec-Trigg?"

"I kicked it out of sight without looking. I didn't have to look. I *felt* the menace—I *knew* the man wanted to kill me. I'm fed up with being accused of lack of *feelings*."

"But you didn't have to kill him to defend yourself?"

"Not at the immediate moment."

Apfelstein considered. "You killed him to avoid the No Fault crime laws."

"Yes. I made a cold intellectual decision. I don't apologize for it."

"Gentlemen, please!"

The Bard turned from George and watched the gymnasts. He was trying to recapture his Navigator role. By sheer will power he forced himself to forget Penelope Plum.

The gymnasts were benefitting from the audience's warmer mood. Their act maintained pace and was a success.

The brisk Navigator theme struck up, and the Bard strode onstage, magnificent under the spotlight. A surge of interest and admiration met him.

But throughout the theater scattered couples noisily stumbled to the exits. Penelope had hired a claque.

The Bard spoke over the noise, his voice taking on hypnotic cadence. "Wait. You are free to leave, but—wait. Because you are free to leave—*wait*."

The house quieted. The Bard went on, "Freedom—why do you have it? Because tyranny cannot stretch over light-years. *Think* what you enjoy because of star travel! An uncrowded planet—because of space. A clean, unpolluted planet—because of techniques developed for space Wheels.

"And there is no longer a division

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between Earth dwellers and space dwellers—only a *neighborhood* extending from here to Proxima Centauri. Most of you are *going out* on this starship—but some of you are also *going home*. Only a computer can set up flight schedules and working schedules, because the circuit is interwoven with flights. The Waystation thread has become a rope.

"Some of you are worried about homesickness—but when you get to Proxima you'll find people telling you that Earth is a nice place to visit, but they wouldn't want to live there."

Laughter eddied around the Rotunda, but the claque had not given up. The Bard saw Penelope among them, still in her milkmaid costume but holding a hand-amplifier. She sprang lightly on top of a table near the stage and called out, "What of the price, Bard Laureate? Must we sell our humanity to survive in space?"

"*You* survived, Penelope."

"But I came *home*—to warm blue skies and a safe planet! I didn't want to be a calculating space robot without feelings, like *you*!"

The Bard made a gesture, and a spotlight held Penelope in a bright pool. He asked, "What don't I feel, Penelope?"

"Anything! Sympathy—pity—love—"

"And humor?"

She choked on tearful laughter. "Especially humor."

The Bard drew his Lec-Trigg and sighted. The house gasped. Penelope gauged his timing and ducked as a white stream needled from the Lec-Trigg—the Proxima circuit's custard pie. If anyone else had been firing the Lec-Trigg, the stream would have gone over Penelope's head. But the Bard had anticipated her move—and his timing was equally good—so the stream foamed over her bowed head and hunched shoulders.

A delighted roar seemed to lift the roof. The Bard grinned, "Dad Plum didn't teach you *all* the tricks, Penelope." Then he gestured for the spotlight and house lights to be doused, so that she could exit without further humiliation.

The audience was chuckling over the Bard's unexpected victory. He holstered the Lec-Trigg, waited for the laughter to subside, and gave the cue to the orchestra. The light drumbeat picked up the Navigator's chant. The Bard, squaring his shoulders and rocking on his heels to rhythm, sent a virile, lusty voice resounding around the Rotunda.

"*What fills a nav-i-gay-tor's life*?"

"*In-fin-i-tees of lines*!" chorused the audience, who knew the chant by heart.

"*Parabolas, hyperbolas, and warping o-my-golly-as . . .*"

They were caught up in the fun and zest. Nobody, least of all the Bard, knew or cared what had happened to the heckling claque. The verses continued, varying in mood and tone like a symphony. Sometimes the audience chanted along until the walls shook. Sometimes they listened, bemused by beauty and tenderness . . . *grief, star-*

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dust soft, that dimmed his soul . . .

After the final verse had died away, they gave the Bard a standing ovation. When they reluctantly let him go and the curtain closed, he felt weak, ill from nervous and physical exhaustion. He walked off the stage, and Apfelstein patted his shoulder. "You've never been better, Vardos."

"Where's Penelope?"

"In her dressing room, I guess. The drama chief came to give her the troupe's walking papers. A hotel dining Rotunda can't permit rowdiness. Security should have canceled her, to begin with."

"No. First she had to be outplayed."

"Well, forget her and relax. A good meal of Nepal ox-steak—"

"In half an hour George. There's still something I don't understand."

He walked backstage and tapped at Penelope's dressing room door. "It's Vardos, Penelope."

A pause. Then a tired, "Come in."

He entered. She was still in her foam-smeared milkmaid costume, sitting at the light-rimmed dressing table. The dismissal papers were in front of her. She swung from the mirror to face him, a 3D portrait cube in her hand. She said, "Yes, your calculated skill beat me. We can never win, can we?"

"What do you want to win?"

"Self-respect. Kindness, maybe." She held up the cube. "He was always bewildered because his plumber act went out of style. Poor dad! Playing his heart out on the Proxima circuit—dreaming of a comeback on Earth. We were on our way home when he died, his dreams still making him happy. He was so proud of me, you know—so sure that he and I would make a great team, Plum and Sugar Plum—"

Tears welled from her silver lashes. "It could never have been. I knew—children see so clearly—that the space people had no use for impulsive, sentimental, nonplanners like Dad."

"And you're trying to revenge his memory?"

"Not revenge. I'm trying to rekindle the embers of human feeling—human failings. I want people to come back to Earth, where they can be *people*—imperfect, loving and hating and feeling! If cold-blooded propagandists like you would leave them alone—"

"Cold-blooded?"

"To me, space glory is a cold thing. It's won by cold discipline—cold foresight—cold intellect. And you color it, warm it up, make it seem desirable, with words."

"You've got it all wrong, Penelope. Space *was* cold—and people are warming it up. They don't forget their hearts because they discipline their minds.

"I remember your Dad's act. It went out of style because he was too lazy to adjust to the times. If you're successful, Penelope, with his old routines, its's because you're a disciplined performer, a perfectionist about production details—and you learned discipline and perfection in space."

She was silent, looking at the cube.

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He went on, "Don't wreck your career, bucking the space tide. Find other comedy themes. Above all, don't keep trying to remove me. I'm not all that important."

"Of course you are! But I've never tried to *remove* you—just to make you look foolish. That day on the balcony—we were going to spray you with luminous paint, so you'd glow purple for a month. It was nothing for you to *kill* a man for."

"That Lec-Trigg is still under the recliner. I'm betting it's a real Lec-Trigg, Penelope."

"Why?"

"Because the knife thrown at me last night was a real knife. George Apfelstein can show you where he hid it, after he made a switch from your property trunk."

"You and George would plant evidence on your dying grandmothers. I wouldn't trust either of you."

"But I trust you, Penelope. You're going home tomorrow, aren't you? I'll write an authorization for the hive super to let you into my residence. Look at the Lec-Trigg, and then phone me. If you say it's a property weapon, I'll believe you."

"Even if the weapon was real, you didn't have to *kill* the man."

"I don't argue if's. Do you want the authorization?"

She put the cube carefully on the table. "Yes. If my orders are being exceeded, I have to face the truth. That's another thing I learned—in space."

She put her hands over her eyes. He went out, gently closing the dressing room door.

That same evening, before sitting down to the ox-steak supper Apfelstein had ordered, the Bard sent a hotel messenger to Penelope's room, with the authorization he had promised her.

"What does it matter," grumbled Apfelstein, "whether the Lec-Trigg was real or property?"

"Logically, it doesn't matter," said the Bard. "Nothing can change the past or bring the man back. Emotionally, it matters a great deal. I *hope* I did not kill a mere fool."

Apfelstein studied him. "And you *hope* Penelope Plum will eye you more favorably."

"Yes. But I have less selfish hopes for Penelope, also. I hope she'll realize that an unthinking welter of *feelings* does no good—and can do much harm. An emotional person is an easy prey to scoundrels. I daresay—"

He paused as the idea sparked his genius. Apfelstein prompted, "You daresay—"

"That the pre-Melt wars were emotional in origin, not economic—"

Nevertheless, the Bard was pleased that Penelope's flaw was too much *heart*.

The next afternoon he grew restless, awaiting word from her. At last the phone chimed and the small viewing panel lit up. He eagerly activated his own sender—and seemed to be looking at Penelope across a desk. She apparently was in her own residence.

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Her face was that fashionable facade, but her eyes betrayed her sad confusion. "You were right," she said. "The Lec-Trigg was real."

"I *hoped* it was real."

"And now you feel justified in killing the man."

"Yes. He was no longer a *thinking* man. He was a random force that could have turned against anyone—even against you."

"But he *felt* so deeply!"

"What about your knife-throwing clown—does *he* feel deeply?"

She took a shaky breath. "We've been stupid, haven't we?"

"You didn't *think*. You let disordered emotion drive you to a direct attack—and disaster. Instead of patiently continuing to milk the space theme, you shot the cow. Your next Follies will have to be completely rewritten—and recast."

"I won't climb aboard the space bandwagon."

"What *will* you do?"

"Maybe travel back to where Dad and I were happy—even though the spacemen never appreciated him. We could dream our private dreams on the long space hauls."

"You'd be making your Dad's mistake—running away instead of using your brains. Stop insisting on those damned either/or emotional decisions. Try a comedy theme that has nothing to do with space."

"Such as—?"

He remembered his new epic. "Such as the twentieth century paradox. Those throwbacks were clowns, without even trying. Put your troupe in a time machine—splice satire into the historical line—and you'll have the customers rolling in the aisles. You're welcome to use my research tapes. If your present troupe jibs at the switch and you're afraid to fire 'em, hire George Apfelstein. Firing a lousy cast makes George's whole day."

He heard an anguished protest from the listening Apfelstein, but ignored it. He had seen a flicker of interest enliven Penelope's eyes. He pursued. "*Think* about it—and have a working lunch with George and me when we come back from here."

She hesitated. "All right, Vardos. Until then—I'll *think*—"

She cut off the call, and Apfelstein bounced around the room in angry bewilderment. "Are you crazy, Vardos? Not only do you hand her your new epic for a Follies theme—but you hand her *me*!"

"You heard her, George. She was going to run away—to live on her memories in the Proxima circuit."

"So what?"

"So I would have run after her."

"I don't believe it. You wouldn't wreck your career for—*love*!"

"Wouldn't I?"

Apfelstein simmered down. "Okay, okay. The epic maybe can be written off. And I can put her on to a new manager. It'll work out."

"Of course it'll work out. Brilliantly."

"Will you stop with that confounded being right all the time!" yelled George Apfelstein. ■

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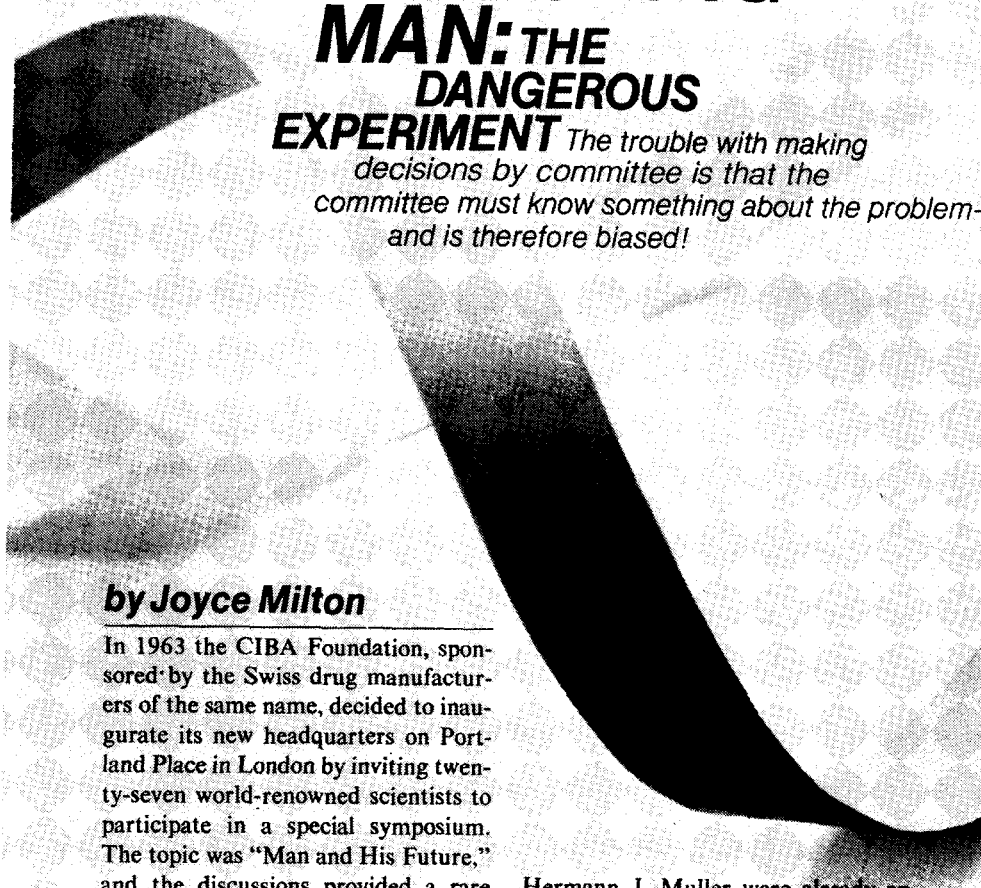
REDESIGNING MAN: THE DANGEROUS EXPERIMENT

The trouble with making decisions by committee is that the committee must know something about the problem—and is therefore biased!



by Joyce Milton

In 1963 the CIBA Foundation, sponsored by the Swiss drug manufacturers of the same name, decided to inaugurate its new headquarters on Portland Place in London by inviting twenty-seven world-renowned scientists to participate in a special symposium. The topic was "Man and His Future," and the discussions provided a rare opportunity for the best brains in science to share their wildest speculations on the shape of things to come.

Perhaps the most controversial individual at the symposium was the American geneticist Joshua Lederberg. Lederberg began by telling his astonished audience that the sperm banks long proposed by his colleague Hermann J. Muller were already an obsolete idea. The assembled scientists, many of whom considered Muller's proposal for freezing the sperm of famous men to be pretty far out, were told that human engineering and direct manipulation of the basic genetic material known as DNA would soon make it possible to redesign human beings on a scale that Muller's genera-

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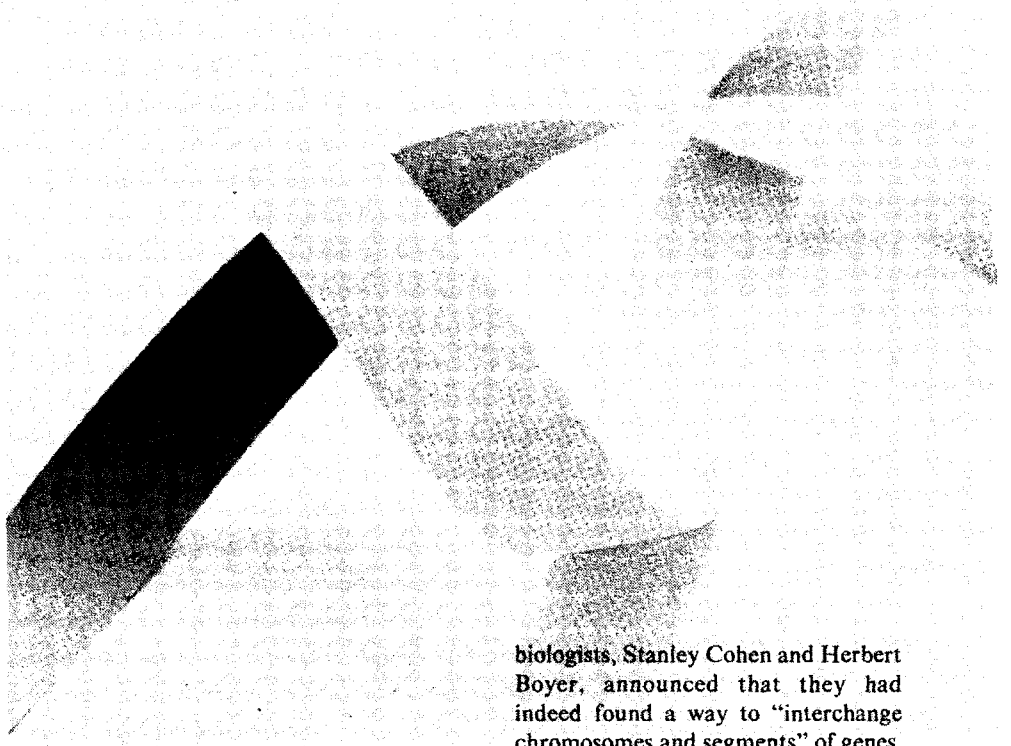

tion had never dreamed of.

In particular, Lederberg predicted that "we might anticipate *in vitro* [test tube] cultures of germ cells and such manipulations as the interchange of chromosomes and segments. The ultimate application of molecular biology would be the direct control of nucleotide sequences in human chromosomes . . ."

Lederberg has proved to be a better futurologist than many of his fellow scientists. Only ten years after he made this prediction, two molecular biologists, Stanley Cohen and Herbert Boyer, announced that they had indeed found a way to "interchange chromosomes and segments" of genes. The new technique, which has come to be called DNA recombinant research, makes it possible to take a small piece of DNA from any living organism and join it to another length of DNA, usually a simple form such as a virus or plasmid. The resulting hybrid genes can then be inserted into "host" bacteria where they proceed to duplicate themselves.

The beauty of Cohen and Boyer's discovery was their use of a group of chemical catalysts, called restriction enzymes and ligases, to do the work of

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chopping up the DNA and splicing it back together in new combinations. Molecular biologists had previously managed to synthesize small lengths of DNA; these pioneering experiments were the basis of the periodic announcements that someone had created "life in a test tube" which were a staple of 1960s journalism. But synthesizing DNA one step at a time had been an intricate process. Recombining DNA by means of enzymes was relatively uncomplicated. One biologist had even predicted that within ten years gene splicing kits could become a staple of every high school biology lab.

It didn't take long for the scientific world to recognize the importance of this breakthrough for basic research. The ability to produce self-duplicating specimens of pure DNA in one's own lab would make possible all kinds of studies, including the "mapping" of human and other chromosomes—work that we once thought would take decades, even centuries, to accomplish.

By 1976 the distinguished microbiologist Salvador Luria was saying that gene splicing was no longer a novelty, but as basic to biological research as the use of the microscope. To a degree, however, gene splicing has also become something of a scientific fad. The smell of Nobel Prizes is in the wind, and few ambitious molecular biologists feel they can pass up a chance to try their hand at the new technique. There have already been cases of researchers wanting to use gene splicing for jobs that more conventional methods could do just as well.

Industry has also been quick to pick up on the potential of using recombinant DNA research to solve practical problems. Cheap supplies of human insulin, new food crops which do not require chemical fertilizers, organisms that eat up oil spills, and, of course, a cure for cancer are among the many possibilities that have been suggested. One of the most intriguing ideas, raised by Stanley Cohen himself, is that recombinant organisms might be the answer to the energy crisis. Cohen thinks that certain algae, which use sunlight to extract hydrogen from water, might be modified into a totally pollution-free source of power. Many of these predictions are sheer speculation; finding the right genes and activating them—getting them to work as they do in nature—is still a major problem. But corporations have begun to invest heavily in genetic research and the smart money on Wall Street is already banking on the bio-futures industry as the growth field of the future.

Meanwhile, recombinant DNA has generated at least as much fear as hope. One of the big problems from the beginning has been the use of *E. coli* as a "host" bacteria. *E. coli* has been a favorite of biological researchers for decades; it has some special genetic features which make it convenient for recombinant work, but, mainly, scientists like it because they have studied it for so long. As many

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people know, *E. coli* in nature is a ubiquitous and normally harmless resident of the human gut. Less well known is the fact that *E. coli* is also a major agent of in-hospital infections where it can actually kill patients weakened by other diseases and injuries. The strain of *E. coli* that scientists use in their labs is so well adapted to life inside a test tube that it is no longer as hardy as normal *E. coli*. But many people have feared that laboratory *E. coli* with recombinant genes inside it could be an unpredictable commodity indeed.

A striking example of the uncertainty surrounding foreign genes in *E. coli* occurred at the General Electric Research Laboratories in Schenectady, New York. There, Ananda Chakrabarty, who was interested in developing organisms that could manufacture methane gas from sewage, managed, without even using recombinant technology *per se*, to implant a gene for the production of cellulase enzyme into *E. coli*. Chakrabarty's new form of *E. coli* was now capable of digesting cellulose fibers.

Some time after completing his experiment, Chakrabarty began to ponder what might happen if his organism got into people's digestive tracts. It occurred to him that this might not be a good thing. "Every time you ate a lettuce you might have a lot of gas in the stomach and that is not a bright prospect," reflected Chakrabarty. "So because of this and without any other kind of evidence, we destroyed the bug."

Chakrabarty is the hero of this particular story. But the incident made a lot of people wonder whether every scientist would be as cautious. Much of the new recombinant research will be done in private industry under top secret conditions. Chakrabarty's example shows that scientists in this situation can create any kind of "bug" they think might be interesting without paying much attention to the dangers involved.

If you have followed the reports in the newspapers you probably know that in 1974 eleven leading molecular biologists, led by Paul Berg of Stanford, called for an international moratorium on certain "indiscriminate" kinds of gene splicing. Other scientists soon entered the argument and the dangers of recombinant DNA became a hot public issue, particularly in Cambridge, Massachusetts where Mayor Alfred Vellucci ordered an investigation into the possibility that Harvard scientists were creating "Frankenstein's monsters" and that Cambridge citizens might soon be faced with unknown horrors "crawling outta da sewers."

Lately, however, we have been seeing reports that the experts no longer believe DNA recombinant experiments are dangerous. These newspaper articles may lead the public to think that dramatic new evidence has been uncovered. Unfortunately, this is not quite the case. There are still more questions than answers on this subject.

What has changed since 1974 is

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that more and more molecular biologists are committed to doing recombinant research. These scientists, who are not used to being in the public spotlight, have become very uncomfortable with the increasing concern about their work on the part of laymen. Many of them are afraid—both rationally and irrationally—that all the publicity will lead to restrictions on their experiments. They also worry that widespread discussion of some of the less desirable applications of genetic research—human engineering, for example—could lead to rethinking the decision to invest millions of dollars in tax money *in this particular field of science.*

One of the most curious aspects of the whole argument is that ten years ago it was the geneticists themselves who were saying, and warning, that the "ultimate application" of their work would lie in human cloning and genetic surgery. Now, when we are a giant step closer to actually doing these things, the very same scientists dismiss such warnings as irresponsible "science fiction."

The argument over the safety of recombinant DNA goes back to 1971 when Paul Berg was planning to do an experiment that would be a forerunner of Cohen and Boyer's successful gene implantation work. Without relying on the restriction enzymes these men later used, Berg was going to try a gene splicing experiment that involved a simple three-gene virus known as SV40.

About the same time, there happened to be a conference on tumor viruses held at the Cold Spring Harbor Laboratories in Long Island, New York. Cold Spring, a major center for cancer research, had been plagued by rumors that scientists and even their families were contracting cancer from their work. There had also been criticism that today's molecular biologist, who often has as much training in physics and chemistry as in the traditional life sciences, is apt to be a "slob" when it comes to handling dangerous organisms. In response to this kind of talk, a young biologist named Robert Pollack decided to hold a special workshop on lab safety.

Pollack found the subject of safety to be surprisingly controversial. One member of his audience, a young woman from Paul Berg's Stanford lab, created an especially big stir by describing Berg's proposed experiment in enthusiastic terms.

Pollack and some of the others present did not share her enthusiasm. SV40 is a virus known to cause cancer in mice and in laboratory cultures of human cells. There is no evidence that it is directly harmful to human beings, but, like the role of the so-called "tumor viruses" in general, this is a highly controversial question.

Scientists have a special reason to be nervous about SV40. It seems that in the late 1950s and early 1960s large batches of polio vaccine accidentally contaminated with SV40 were administered to millions of American children. So far, no adverse effects have been discovered. But tumor viruses

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may take decades to cause trouble—if indeed, they cause trouble at all. And this unwitting mass experiment is not the sort of thing many scientists would like to repeat.

After the Cold Spring workshop Robert Pollack took the initiative to phone Berg and ask him not to use SV40. At first Berg could not see what all the fuss was about, but when he found that some researchers in his own lab agreed with Pollack, he decided to cancel the experiment. The matter seemed to be resolved.

Two years later, biologists who had gathered for an annual summer event known as the Gordon Conference on Nucleic Acids heard the news of Cohen and Boyer's success. It was now obvious that gene splicing would no longer be limited to a few elite laboratories. The question of whether such experiments were dangerous now became much more urgent, and a group of biologists, mostly younger men, voted to send a letter to *Science* magazine expressing their concern. To the dismay of many older scientists, who protested that such things simply were not debated in public, the letter was published.

Berg had now been thinking about the dangers of gene splicing for several years, and the so-called Gordon letter prompted the National Academy of Sciences to ask him to look into the matter on their behalf. Berg called together ten other pioneers in the field, and it was this group which issued the call for a moratorium on certain kinds of recombinant experiments, especially work with toxic and disease-causing substances.

The moratorium was supposed to last only until a new policy could be evolved. Never in their wildest dreams had the moratorium's originators considered calling for a permanent halt to all gene splicing research. Nor were they the least bit concerned with the social and philosophical implications of the new technique. When their action began to inspire others to look into these things—and to conclude, in some cases, that the whole line of research might be dangerous—some of the moratorium group began to feel like men who discover that they have been digging their own graves.

In February of 1975 some 140 biologists gathered at the Asilomar Conference Center near Monterey, California to decide what to do next. The atmosphere at Asilomar was a confusing mixture of honest concern, haste to get the whole mess over with and go back to business as usual, and paranoia over the presence of reporters from popular magazines like *Rolling Stone*. After days of intense discussion, the conference managed to agree on a surprisingly strong series of recommendations, calling for controls on the new experiments based on a graded scale of risks.

As a starting point for future investigation the Asilomar Conference was impressive indeed. There were, however, a few serious problem spots. One weakness was that nobody really knew how dangerous DNA recombinant work was, and so the conference's

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decision to rate some kinds of the experiments as more risky than others was based on a shaky combination of guesswork and political compromise.

The second danger signal was the conferees' assumption that the power to regulate the research—or not regulate it, as the case may be—lay in their hands alone. The Asilomar Conference reflected a general attitude on the part of scientists that experimental work, by its very nature, involves a certain degree of risk and that the public ought to be willing to accept this and leave the worrying to the experts. At its extremes, this state of mind could be pretty naive. For example, when a lawyer warned the scientists that they could be sued for damages if someone died or got sick as a result of work done in their labs, the reaction was shock and disbelief.

Immediately after the Asilomar meeting, the federal government entered the picture in the form of the National Institutes for Health. The NIH is the agency which is responsible for handing out the tax dollars which pay for a good deal of the biological research done in universities and research institutes. As Paul Berg and others had suggested, the NIH appointed a special committee to write a set of federal guidelines on recombinant DNA research. These guidelines would apply *only* to experimental programs paid for by the NIH.

In theory, the new advisory committee had broad powers. It could have rethought the whole question of whether gene splicing should go ahead at all. And it could have set up experiments to get more evidence on the dangers. In practice, the committee limited itself to the job of codifying the recommendations already made at Asilomar into a complicated two-tiered set of restrictions.

One set of restrictions, called physical containment, created four categories of laboratories. These were rated from low risk (P1), which is essentially an ordinary biology lab, to high risk (P4), which is an expensive facility equipped with air locks, showers for employees entering and leaving, a system for decontaminating waste materials, and other complex construction features.

Another set of restrictions was called biological containment. Under this grading system only lesser risk experiments could still be done with ordinary laboratory strains of *E. coli*. Two higher risk categories of experiments (EK2 and EK3) would have to be performed with a special "genetically enfeebled" *E. coli* strain. Since no such strain existed, one committee member, Roy Curtiss of the University of Alabama, volunteered to invent one! A year later he announced that he had come up with a new form of "disarmed" *E. coli*, which was named *chi*1776 in honor of the Bicentennial.

Not everyone was happy with the work done by the NIH Committee. When early drafts of their guidelines turned out to be weaker than the original resolutions passed at Asilomar, many scientists protested vigorously. Meanwhile, a lot of nonscientists, in-

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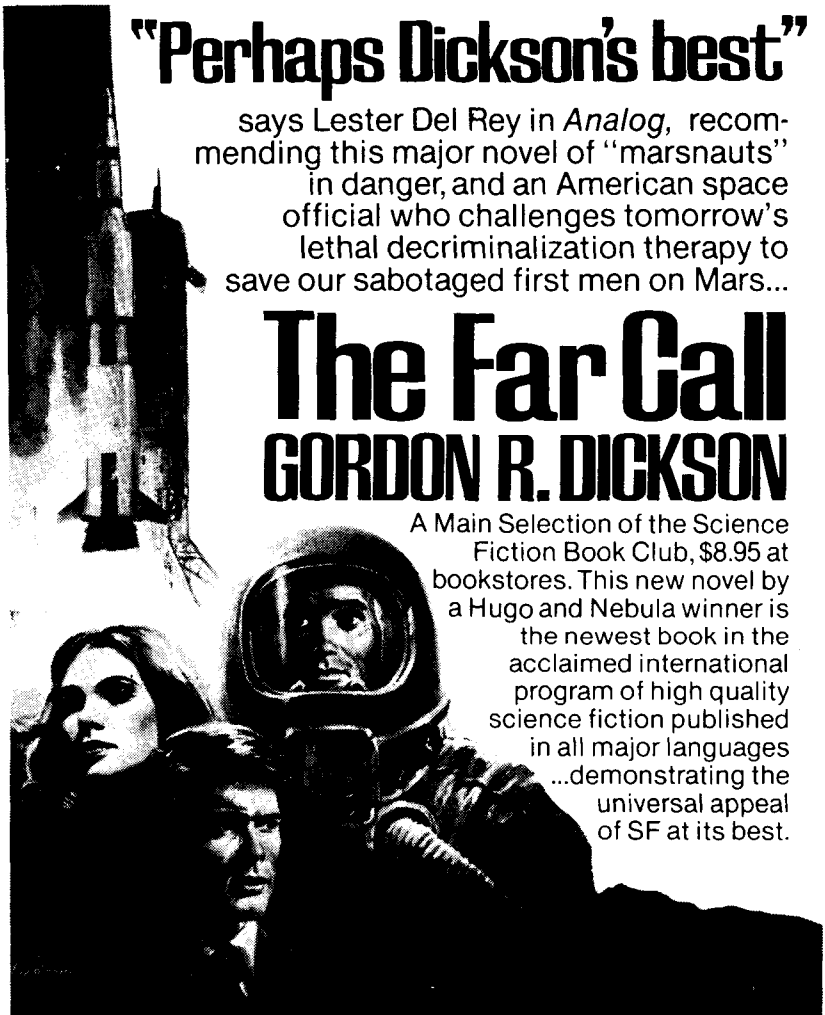

QUANTUM SCIENCE FICTION

The Dial Press/James Wade

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cluding Senator Edward Kennedy, protested that a decision which might affect the whole future of mankind was being made by a tiny group of molecular biologists.

But, wasn't the decision on how to handle this complex new technology one that only these experts could make?

Not necessarily, and for several good reasons.

One problem with the NIH Committee was that it had all the appearances of a classic case of conflict of interest. Almost all of the committee's members were individuals whose careers were closely tied to the research. A good many were, in effect, getting paid by the NIH to do the work—at the same time as they were advising the NIH on whether the work ought to be done! Six of the original sixteen advisors received over a half a million dollars in NIH grants in the year 1976 alone. While the motives of these members may have been the best, it is hard to see how they could be called neutral. In fact, the insidious nature of self-interest had already been noted by Paul Berg himself when he complained at Asilomar that "everybody would like to draw a circle around their own work and stamp it as pure and unadulterated, and it's what *you're* doing that's nasty and ought to be proscribed."

Many of the committee's critics also thought that a group made up almost entirely of genetic research specialists did not really have the right kind of expertise to solve the problem. Other kinds of scientists—including ecologists, specialists in plant and animal diseases, epidemiologists, and, especially, experts on the behavior and spread of *E. coli* bacteria, might have given the committee a broader perspective.

Curiously enough, the NIH Committee itself anticipated these criticisms and suggested, early on in its work, that expanding its membership would be a good idea. For some reason, only token changes were ever made.

At this point, no one can say what a more representative committee might have done. For better or worse, what we now have is an elaborate set of safeguards built on a foundation of assumptions. The safeguards should be adequate—but only if the biologists have been correct in guessing that certain types of the experiments are really "low risk" while others are "moderate" or "high risk." (Remember, the disarmed *chi*1776 strain of *E. coli* will only be used for the work that has been judged relatively hazardous.)

The furor over DNA recombinant research is now over three years old, and many different kinds of dangers have been predicted. Some have warned that foreign genes inserted into *E. coli* could create a virulent and irreversible "doomsday plague" which would wipe out all mankind. Others are worried about less dramatic effects. Mutant strains of *E. coli* might spread an epidemic of urinary infections or diarrhea, certainly not fatal

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but an unpleasant prospect nonetheless. Foreign genes, from a tumor virus such as SV40 might find their way into people's chromosomes only to cause trouble decades later.

Another scenario was proposed by MIT biologist Jonathan King who reasoned that recombinant genes might activate themselves inside human beings and start to produce proteins. A person's body would then react by manufacturing antibodies to ward off the unwanted proteins. Inappropriate antibodies, says King, are the basis of several known diseases. In a case like this, it would be very difficult to trace the illness back to its original cause—the recombinant organism.

A still different objection has been raised by Robert Shinsheimer of Caltech, who fears that mixing genes from higher and lower organisms could subvert the evolutionary process with drastic results. Shinsheimer is particularly worried about what the biologists call "shotgun" experiments. These involve chopping up all the DNA of a given animal, such as a fruit fly or a frog, into random segments. The purpose is to create a "library" of the animal's genes—but "printed" into *E. coli* instead of on paper. Some critics have called these experiments a form of genetic Russian roulette.

Outside experts are only now beginning to come up with opinions on how real these fears actually are. New evidence does suggest that the prospect of a doomsday plague are quite far-fetched. Other news is not so reassuring. Warnings that ordinary laboratory *E. coli* will be strong enough to survive in nature appears to have some foundation. And some of the harshest criticism is now coming from the environmental scientists. Why, they ask, have experiments with plant DNA been relegated to the lowest risk categories?

Of course all the safeguards suggested by the NIH Committee are only good if they are put into practice. There have already been a number of reports that a substantial minority of scientists do not take the guidelines seriously. One journalist, who spent several months working in Herbert Boyer's California lab, recently wrote that some researchers consider it "chic" to ignore the rules and some boast that they have never read them.

Even the federal legislation proposed by Senator Edward Kennedy, which would extend a version of the NIH guidelines to cover private industry, has some gaping loopholes. For one thing, anybody can buy restriction enzymes, *E. coli* strains, and the other raw materials for DNA recombination from a biological supply house and set himself up in the home cloning business.

There are no laws governing who buys these materials. And, should an American supply house balk at selling them, it is always possible to order them from abroad. Advertisements offering to ship "toxic chemicals to any destination" have actually appeared in *Nature*, the leading British scientific journal.

If you would like to try your hand at

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home cloning, a recipe for "lambda phage carrying clostridium genes" recently appeared in a Boston underground newspaper. Should this project sound too technical to be interesting, the article goes on to say that another name for the same concoction would be "botulism soup." According to the recipe's inventor, an MIT biologist, no sophisticated lab equipment is required, and the whole experiment would cost less than $350. A list of "where to get the ingredients" is thoughtfully appended and the instructions are quite cheery: "Have fun, but don't lick your fingers," they warn.

The prospect of amateur scientists, and even terrorists, tinkering with botulism genes in basements and garages points up the need to regulate DNA recombinant experiments at their source—by licensing the purchasers and importers of restriction enzymes.

It is probably already too late to isolate gene splicing experiments in sites deep in the desert or even on space vehicles, as was suggested by several people during the 1976 hearings in Cambridge, Massachusetts. But it is not too late to reverse the trend toward doing the research everywhere and anywhere. High risk research has already been done in a mobile trailer on the ground of the NIH headquarters in Maryland. And moderate risk work is now carried out at not one, but a whole handful of locations in crowded, blackout prone New York City. When one considers that research on hoof and mouth disease, a condition that effects livestock and not people, is limited to a single island off the coast of New York, the contradiction is curious indeed.

How can the true risks of gene splicing be discovered and then contained? A group of scientists right now is setting up what has been called the "Dangerous Experiment." This will involve purposely infecting germ-free laboratory animals with recombinant organisms containing highly toxic genes—all under supercontrolled conditions, of course. The most dangerous thing about the "Dangerous Experiment" is that no one wants to do it more than once or twice. On the other hand, if nothing happens the first time, the negative results may create a false sense of confidence.

Meanwhile, scientists in England are working on a remote control system which could remove the risk of human error from recombinant work. Of course, a simpler solution than both of these would be simply to delay gene splicing a few years until a suitable alternative host to *E. coli* is found. No one could force the rest of the world to go along with such a delay, but the fact that Berg's original moratorium was internationally observed shows that the prospects might be better than one might think. Surprisingly, the biggest opposition might not come from the Soviet Union, where genetic engineering has not been viewed with suspicion. The country most committed to genetic research right now is, of all places, idyllic Switzerland—where international

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pharmaceutical companies are such a big factor in the economy that they can call their own tune.

One of the most sensible proposals comes from the Environmental Protection Agency. Scientists there have advocated putting biological tracers on recombinant organisms, and setting up teams of specialists to monitor the environment for their presence. Many scientists now boast that there have been no "accidents" with the new technology so far. What they do not say is that there is no way of knowing whether recombinant genes have already passed into the environment.

The history of the recombinant DNA controversy has shown once again that you can't sit back and trust the government—or even the scientists, it seems—to do the logical thing. Rational decisions about the future of genetic engineering will only be made if the general public takes the trouble to learn what is going on and makes its opinions known. Individuals, even young people, can have a surprising amount of influence on these issues. This is true because most politicians don't really understand the problem and are willing to listen to anyone who seems to know what he is talking about. The scientists, on the other hand, might like to do their experiments with as few legal restrictions as possible, but most of them really don't care to get involved with the social applications or misapplications of their discoveries. The argument that regulating recombinant work will lead to "Lysenkoism" or a modern-day inquisition is simply wrongheaded. No one is proposing telling scientists what to think or to write, and there has never been any legal "right" to do dangerous experiments. In fact, all of the biologists, from the Berg group on down, have agreed that the social decisions about genetic research are not their business.

Genetics is one of the most misunderstood branches of science and we can no longer afford to be ignorant of its basic lessons. With all the recent talk about genetic engineering and sociobiology, half-baked genetic theories have already become something of a fad. A writer in *Psychology Today*, for example, recently speculated that people, especially Germans and Japanese, may engage in terrorist activities because they are born with a "gene for terrorism." A few years ago, the same writer might have blamed a childhood trauma or poverty, but there is a special danger in blaming "bad genes" for any behavior we do not like.

The Nazis' program to promote their notion of a "master race" is probably the best known example of how mistaken ideas about genetics can serve the purposes of prejudice. But it is not only political fanatics who can fall into this trap. One of the interesting things about the CIBA discussions mentioned earlier is that even the world's greatest geneticists are not immune. Francis Crick, the codiscoverer of DNA, theorized—quite unscientifically—that good genes would be correlated with social and financial success. Joshua Lederberg, himself an

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intelligent man, seemed to think that manufacturing more intelligent human beings would solve the world's problems. This despite the warnings of his colleagues that we would inevitably end up producing "more intelligent criminals" along with smarter scientists, philosophers and teachers.

We should not be too hard on the scientists for allowing their own biases to influence their views on this issue. In reading about genetics there is an almost irresistible temptation to accept the proposition that: "My genes are okay, but I'm not so sure about the next guy's." It is sobering to learn that, statistically speaking, the chances that you and I are carriers of at least one "defective" gene are overwhelming. "Bad genes" are distributed throughout the population and are not limited to a minority of individuals. Furthermore, recent research has suggested that pinpointing and altering one gene without changing all the rest in unexpected ways may be the most difficult task of all. There could be a lot of surprises in store before we learn how to make human beings more intelligent or more kind.

Most of the talk about gene splicing so far has centered on what might happen accidentally. But the things that will be done on purpose are just as worrisome. The practice of allowing corporations to patent the processes for creating man-made organisms may be setting a dangerous precedent. In the long run, the corporations may be more likely than the government to come up with useful applications of the research. But secrecy and the specter of privately owned man-made species must be eliminated. The worst thing we could do, now seriously proposed by some of the same scientists who say the research is perfectly safe, is to pass a law exempting genetic researchers from liability for any damage they cause.

Recombinant DNA technology has brought us to the threshold of perhaps the most important decision in the history of mankind. We will soon have to choose between two paths:

On the one hand, we can continue to change our environment to meet our human needs. This path leads to a number of options. We can concentrate on cleaning up this planet and controlling our population; we can use genetic research to create new sources of food and energy; we can even build new habitats for ourselves in outer space.

On the other hand, we may soon have the technology to adapt man to suit our polluted environment. Some biologists have already suggested working toward pollution-breathing, cancer-resistant human beings. We could "solve" the food shortage by turning people into grass-eaters. We could tailor people to their occupations, creating both superbrains and humanoid robots capable of doing the dirty work of society better than any mechanical contrivances. Some scientists are already talking about making chimpanzee-human crossbreeds.

These are old ideas, but they are no longer limited to fiction. It is good to

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remember that there is unlikely ever to be a referendum to ask people whether they want to be genetically re-engineered. These things happen gradually. There is now a company in the United States which requires prospective employees to undergo genetic screening—on the theory that some individuals are genetically resistant to certain occupational hazards. The responsibility for creating safe working conditions thus begins to give way to the individual's responsibility to be genetically immune in order to get a job.

Similarly, the controversy over transsexual tennis player Dr. Renee Richards could be just a preview of what will happen when someone fields a team of 8-foot-tall cloned basketball players. Most of us, offhand, would say that genetically engineered athletes shouldn't be allowed to compete. We forget that such players will be human beings with the same legal rights—and feelings—as any "ordinary" person.

One might also wonder whether tomorrow's students will have to compete for college admission with the "superbrain" babies that Joshua Lederberg has talked about. Or will there be a quota system to give "normal" kids a chance?

The challenge of the new genetics is not solving problems but defining the problems that need to be solved. Basic research can lead anywhere, but there is no rule that says that every possibility open to us has to be exploited. The difficulty of setting the right goals for ourselves was pointed out ten years ago by Robert Heinlein in a book called *Turning Points: Essays in the Art of Science Fiction.* Heinlein then expressed his disappointment that his earlier predictions of a dramatic new solution to the housing problem had not come true:

"There has been no breakthrough in housing, nor is any now in prospect—instead, the ancient, wasteful methods of building are now being confirmed by public subsidies," Heinlein said. "In the meantime spectacular progress has been made in organ transplants . . . Biochemistry and genetics have made a spectacular breakthrough in 'cracking' the genetic code. It is a tiny crack, however, with a long way to go before we will be able to 'tailor' human beings by gene manipulation . . . This is probably just as well. If we aren't bright enough to build decent houses, are we bright enough to play God with the architecture of human beings?"

The last decade has shown that today's biologists are indeed "bright enough" to put the means for playing God into our hands—and sooner than even Heinlein thought would be possible. Will we also be bright enough to be the masters of the new technology instead of its victims? ■

Joyce Milton is a freelance writer with particular interest in environmental and science-related subjects. For the past year she has worked with Francine Simring of the Coalition for Responsible Genetic Research.

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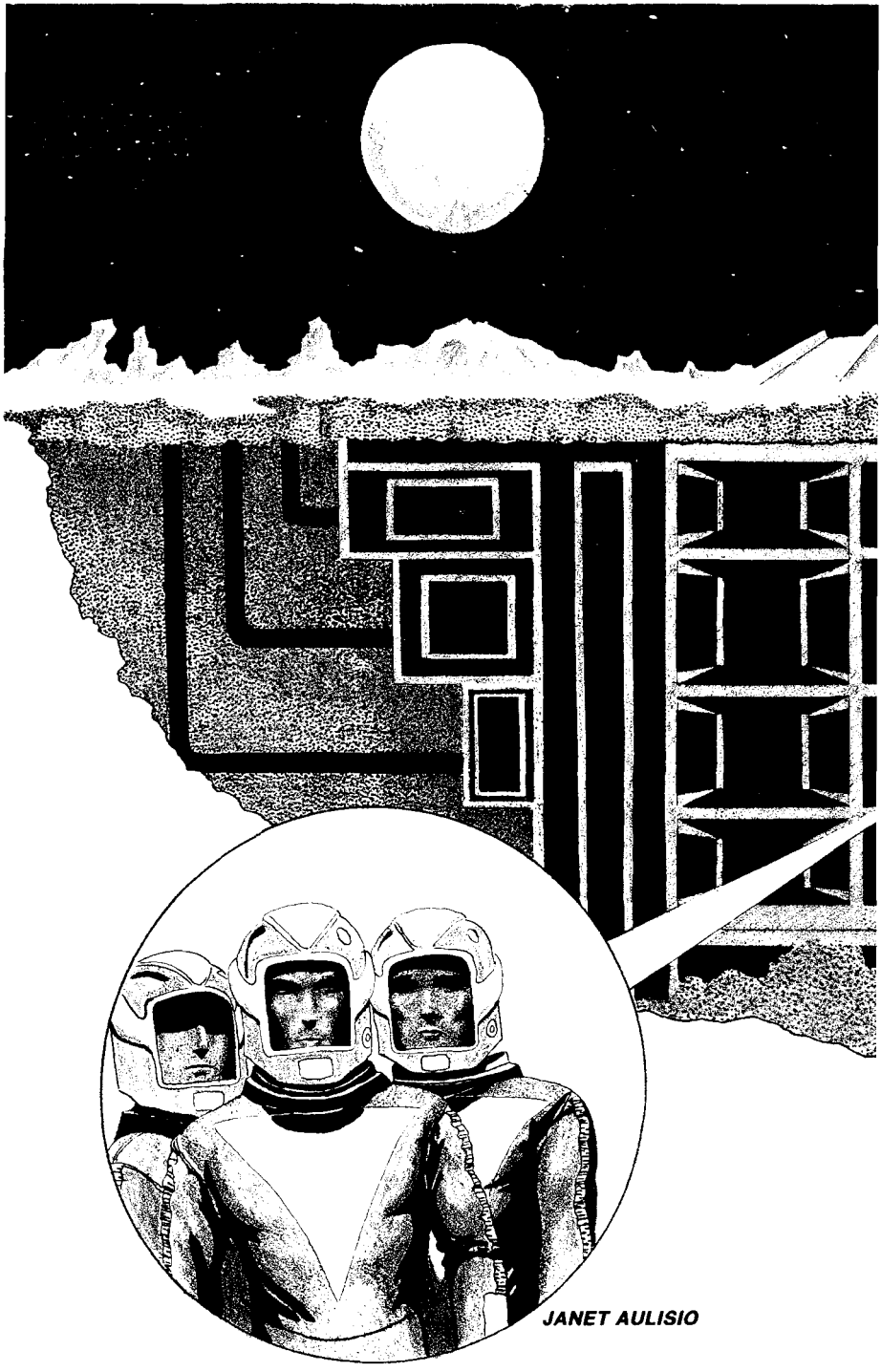

JANET AULISIO

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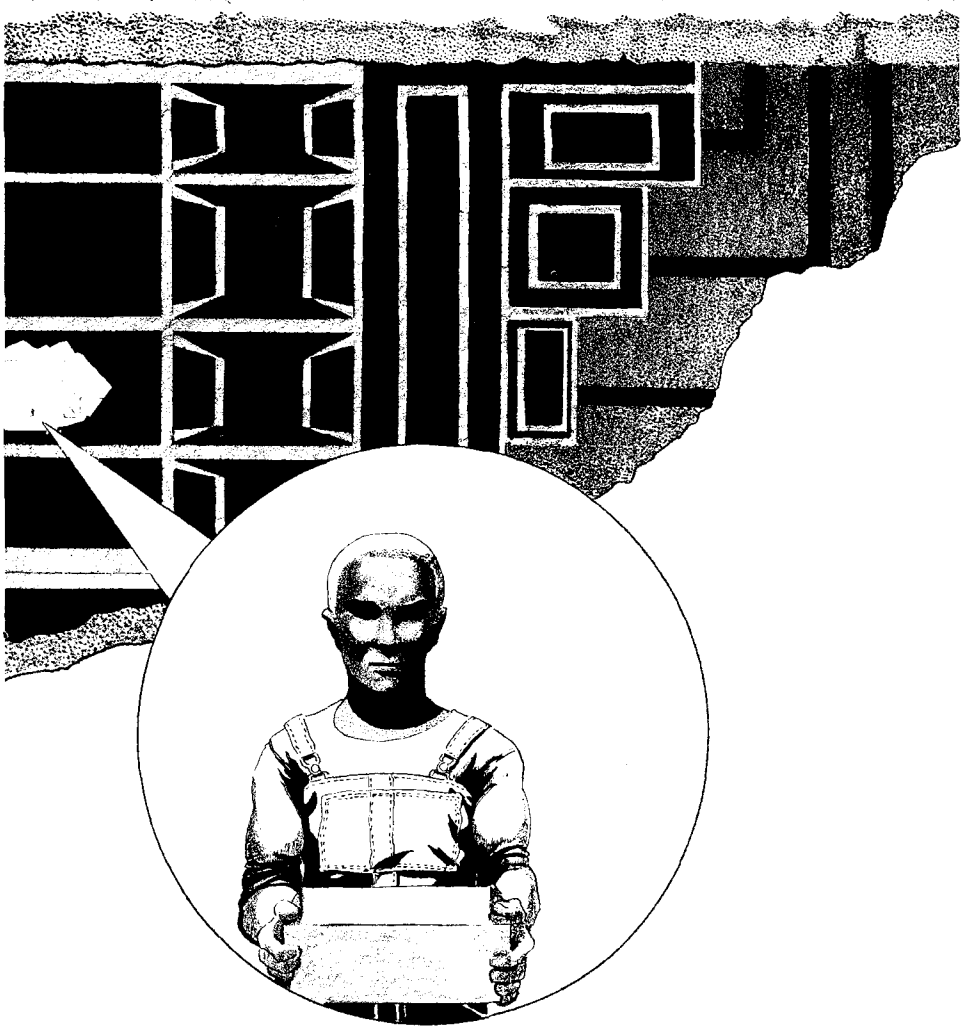
I PUT MY BLUE GENES ON

Biological warfare? You ain't seen nuthin' yet!

ORSON SCOTT CARD



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It had taken three weeks to get there—longer than any man in living memory had been in space, and there were four of us crammed into the little Hunter III skipship. It gave us a hearty appreciation for the pioneers, who had had to crawl across space at a tenth of the speed of light. No wonder only three colonies ever got founded. Everybody else must have eaten each other alive after the first month in space.

Harold had taken a swing at Amauri the last day, and if we hadn't hit the homing signal I would have ordered the ship turned around to go home to Núncamais, which was mother and apple pie to everybody but me—I'm from Pennsylvania. But we got the homing signal, and set the computer to scanning the old maps, and after a few hours found ourselves in stationary orbit over Prescott, Arizona.

At least that's what the geologer said, and computers can't lie. It didn't look like what the old books *said* Arizona should look like.

But there was the homing signal, broadcasting in Old English: "God Bless America, come in, safe landing guaranteed." The computer assured us that in Old English the word *guarantee* was *not* obscene but rather had something to do with a statement being particularly trustworthy—we had a chuckle over that one.

But we were excited, too. When great-great-great-great to the umpteenth power grandpa and grandma upped their balloons from old Terra Firma eight hundred years ago, it had been to escape the ravages of microbiological warfare that was just beginning (a few germs in a sneak attack on Madagascar, quickly spreading to epidemic proportions, and South Africa holding the world ransom for the antidote; quick retaliation with virulent cancer; you guess the rest). And even from a couple of miles out in space, it was pretty obvious that the war hadn't stopped there. And yet there was this homing signal.

"Obviamente automática," Amauri observed. "Obviously automatic."

"*Que* máquina, que não pofa em tantos anos, bichinha! Não acredito!" retorted Harold, and I was afraid I might have a rerun of the day before.

"English," I said. "Might as well get used to it. We'll have to speak it for a few days, at least."

Vladimir sighed. "Merda."

I laughed. "All right, you can keep your scatalogical comments in lingua deporto."

"Are you so sure there's anybody alive down there?" Vladimir asked.

What could I say? I felt it in my bones? So I just threw a sponge at him, which scattered drinking water all over the cabin, and for a few minutes we had a waterfight. I know, discipline, discipline. But we're not a land army up here, and what the hell. I'd rather have my crew acting like crazy children than like crazy grownups.

Actually, I didn't believe that at the level of technology our ancestors had reached in 1992 they could build a machine that would keep running un-

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til 2810. Somebody had to be alive down there—or else they'd gotten smart. Again, the surface of old Terra didn't give many signs that anybody had gotten smart.

So somebody was alive down there. And that was exactly what we had been sent to find out.

They complained when I ordered monkey suits.

"That's old mother *Earth* down there!" Harold argued. For a halibut with an ike of 150 he sure could act like a baiano sometimes.

"Show me the cities," I answered. "Show me the millions of people running around taking the sun in their rawhide summer outfits."

"And there may be germs," Amauri added, in his snottiest voice, and immediately I had another argument going between two men brown enough to know better.

"We will follow," I said in my nasty captain's voice, "standard planetary procedure, whether it's mother Earth or mother—"

And at that moment the monotonous homing signal changed.

"Please respond, please identify, please respond, or we'll blast your asses out of the sky."

We responded. And soon afterward found ourselves in monkey suits wandering around in thick pea soup up to our navels (if we could have located our navels without a map, surrounded as they were with life-saving devices) waiting for somebody to open a door.

A door opened and we picked ourselves up off a very hard floor. Some of the pea soup had fallen down the hatch with us. A gas came into the sterile chamber where we waited, and pretty soon the pea soup settled down and turned into mud.

"Mariajoseijesus!" Amauri muttered. "Aquela merda *vivia*!"

"English," I muttered into the monkey mouth, "and clean up your language."

"That crap was alive," Amauri said, rephrasing and cleaning up his language.

"And now it isn't, but we are." It was hard to be patient.

For all we knew, what passed for humanity here liked eating spacemen. Or sacrificing them to some local deity. We passed a nervous four hours in that cubicle. And I had already laid about five hopeless escape plans—when a door opened, and a person appeared.

He was dressed in a white farmersuit, or at least close to it. He was very short, but smiled pleasantly and beckoned. Proof positive. Living human beings. Mission successful. *Now* we know there was no cause for rejoicing, but at the moment we rejoiced. Backslapping, embracing our little host (afraid of crushing him for a moment), and then into the labyrinth of U.S. MB Warfare Post 004.

They were all very small—not more than 140 centimeters tall—and the first thought that struck me was how much humanity had grown since then. The stars must agree with us, I thought.

Till quiet, methodical Vladimir,

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looking, as always, white as a ghost, pointedly turned a doorknob and touched a lightswitch (it actually was *mechanical*). They were both above eye level for our little friends. So it wasn't the colonists who had grown—it was our cousins from old Gaea who had shrunk.

We tried to catch them up on history, but all they cared about was their own politics. "Are you American?" they kept asking.

"I'm from Pennsylvania," I said, "but these humblebutts are from Núncamais."

They didn't understand.*

"Núncamais. It means never again. In lingua deporto."

Again puzzled. But they asked another question. "Where did your colony *come from*." One track minds.

"Pennsylvania was settled by Americans from Hawaii. We lay no bets as to why they named the damned planet Pennsylvania."

One of the little people piped up, "That's obvious. Cradle of liberty. And *them*?"

"From Brazil," I said.

They conferred quietly on that one, and then apparently decided that while Brazilian ancestry wasn't a capital offense, it didn't exactly confer human status. From then on, they made no attempt to talk to my crew. Just watched them carefully, and talked to me.

Me they loved.

"God bless America," they said.

I felt agreeable. "God bless America," I answered.

Then, again in unison, they made an obscene suggestion as to what I should do with the Russians. I glanced at my compatriots and fellow travelers and shrugged. I repeated the little folks' wish for the Russians' sexual bliss.

Fact time. I won't bore by repeating all the clever questioning and probing that elicited the following information. Partly because it didn't take any questioning. They seemed to have been rehearsing for years what they would say to any visitors from outer space, particularly the descendants of the long-lost colonists. It went this way:

Germ warfare had begun in earnest about three years after we left. Three very cleverly designed cancer viruses had been loosed on the world, apparently by no one at all, since both the Russians and the Americans denied it and the Chinese were all dead. That was when the scientists knuckled down and set to work.

**Though there were some difficulties in communication because of jargon and mild languages changes, the English of Pennsylvania and the English of 004 were very similar. This is because Post 004 was deliberately conservative—and with few changes in environment, there would have been few changes in language. And, of course, Pennsylvania only kept English artificially, for ethnic reasons, since lingua deporto was the native tongue for practically everyone on the three planets at that time. However, by treaty all international space crews had to know the "native" languages of all crew members—which, in the case of Hunter III skipship Pollywog, meant English, essentially unchanged since 2000, and lingua deporto.*

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Recombinant DNA had been a rough enough science when my ancestors took off for the stars—and we hadn't developed it much since then. When you're developing raw planets you have better things to do with your time. But under the pressure of warfare, the science of do-it-yourself genetics had a field day on planet Earth.

"We are constantly developing new strains of viruses and bacteria," they said. "And constantly we are bombarded by the Russians' latest weapons." They were hard-pressed. There weren't many of them in that particular MB Warfare Post, and the enemy's assaults were clever.

And finally the picture became clear. To all of us at once. It was Harold who said, "Fossa-me, mãe! You mean for eight hundred *years* you bunnies've been down here?"

They didn't answer until I asked the question—more politely, too, since I had noticed a certain set to those inscrutable jaws when Harold called them bunnies. Well, they *were* bunnies, white as white could be, but it was tasteless for Harold to call them that, particularly in front of Vladimir, who had more than a slight tendency toward white skin himself.

"Have you Americans been trapped down here ever since the war began?" I asked, trying to put awe into my voice, and succeeding. Horror isn't that far removed from awe, anyway.

They beamed with what I took for pride. And I was beginning to be able to interpret some of their facial expressions. As long as I had good words for America, I was all right.

"Yes, captain Kane Kanea," (somewhere along in there I had introduced myself—it should be obvious by now I'm leaving out some details here and there to speed up this program). "We and our ancestors have been here from the beginning."

"Doesn't it get a little cramped?"

"Not for American soldiers, captain. For the right to life, liberty, and the pursuit of happiness we would sacrifice anything." I didn't ask how much liberty and happiness-pursuing were possible in a hole in the rock. Our hero went on: "We fight on that millions may live, free, able to breathe the clean air of America unoppressed by the lashes of communism."

And then they broke into a few choice hymns about purple mountains and yellow waves with a rousing chorus of God blessing America. It all ended with a mighty shout: "Better dead than red." When it was over we asked them if we could sleep, since according to our ship's time it was well past bedding-down hour.

They put us in a rather small room with three cots in it that were far too short for us. Didn't matter. We couldn't possibly be comfortable in our monkey suits anyway.

Harold wanted to talk in lingua deporto as soon as we were alone, but I managed to convince him without even using my monkey suit's disciplinner button that we didn't want them to think we were trying to keep any secrets. We all took it for granted that they were monitoring us.

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And so our conversation was the sort of conversation that one doesn't mind having overheard by a bunch of crazy patriots.

Amauri: "I am amazed at their great love for America, persisting so many centuries." Translation: "What the hell got these guys so nuts about something as dead as the ancient U.S. empire?"

Me: "Perhaps it is due to such unwavering loyalty to the flag, God, country, and liberty" (I admit I was laying it on thick, but better to be safe, etc.) "that they have been able to survive so long." Translation: "Maybe being crazy fanatics is all that's kept them alive in this hole."

Harold: "I wonder how long we can stay in this bastion of democracy before we must reluctantly go back to our colony of the glorious American dream." Translation: "What are the odds they don't let us go? After all, they're so loony they might think we're spies or something."

Vladimir: "I only hope we can learn from them. Their science is infinitely beyond anything we have hitherto developed with our poor resources." Translation: "We're not going anywhere until I have a chance to do *my* job and check out the local flora and fauna. Eight hundred years of recombining DNA has got to have something we can take back home to Núncamais."

And so the conversation went until we were sick of the flowers and perfume that kept dropping out of our mouths and went to sleep.

The next day was guided tour day, Russian attack day, and damn near good-bye to the crew of the good ship Pollywog (the name of our Hunter III skipship—I just glanced back and realized that I hadn't included that).

The guided tour kept us up hill and down dale for most of the morning. Vladimir was running the tracking computer from his monkey suit. Mine was too busy analyzing the implications of all their comments, while Amauri was absorbing the science and Harold was trying to figure out how to pick his nose with mittens on. Harold was along for the ride—a weapons expert, just in case. Thank God.

We began to be able to tell one little person from another. George Washington Steiner was our usual guide. The big boss, who had talked to us through most of the history lesson the day before was Andrew Jackson Wallichinsky. And the guy who led the singing was Richard Nixon Dixon. The computer told us those were names of beloved American presidents, with surnames added.

And my monkey suit's analysis also told us that the music leader was the *real* big boss, while Andy Jack Wallichinsky was merely the director of scientific research. Seems that the politicians ran the brains, instead of vice versa.

Our guide, G.W. Steiner, was very proud of his assignment. He showed us everything. I mean, even with the monkey suit keeping three-fourths of the gravity away from me, my feet were sore by lunchtime (a quick sip of

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recycled xixi and cocó). And it was impressive. Again, I give it unto you in abbreviated form.

Even though the installation was technically airtight, in fact the enemy viruses and bacteria could get in quite readily. It seems that early in the twenty-first century the Russians had stopped making any kind of radio broadcasts. (I know, that sounds like a non sequitur. Patience, patience.) At first the Americans in 004 had thought they had won. And then, suddenly, a new onslaught of another disease. At this time the 004 researchers had never been *personally* hit by any diseases—the airtight system was working fine. But their commander at that time, Rodney Fletcher, had been very suspicious.

"He thought it was a commie trick," said George Washington Steiner. I began to see the roots of superpatriotism in 004's history.

So Rodney Fletcher set the scientists to working on strengthening the base personnel's antibody system. They plugged away at it for two weeks and came up with three new strains of bacteria that selectively devoured practically anything that wasn't supposed to be in the human body. Just in time, too, because then that new disease hit. It wasn't stopped by the airtight system, because instead of being a virus, it was just two little amino acids and a molecule of lactose, put together *just so*. It fit right through the filters. It sailed right through the antibiotics. It entered right into the lungs of every man, woman, and child in 004. And if Rodney Fletcher hadn't been a paranoid, they all would have died. As it was, only about half lived.

Those two amino acids and the lactose molecule had the ability to fit right into *that* spot on a human DNA and then make the DNA replicate that way. Just one little change—and pretty soon nerves just stopped working.

Those who lived, lived because the new antibody system worked just well enough to slow down the disease's progress until a plug could be found that fit even better into *that* spot on the DNA, keeping the Russians' little devices out. (Can they be called viruses? Can they be called alive? I'll leave it to the godcallers and the philosophers to decide that.)

Trouble was, the plugs also caused all the soldiers' babies to grow up to be very short with a propensity for having their teeth fall out and their eyes go blind at the age of thirty. G.W. Steiner was very proud of the fact that they had managed to correct for the eyes after four generations. He smiled and for the first time we really noticed that his teeth weren't like ours.

"We make them out of a certain bacteria that gets very hard when a particular virus is exposed to it. My own great-great-grandmother invented it," Steiner said. "We're always coming up with new and useful tools."

I asked to see how they did this trick, which brings us full circle to what we saw on the guided tour that day. We saw the laboratories where eleven researchers were playing clever

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little games with DNA. I didn't understand any of it, but my monkey suit assured me that the computer was getting it all.

We also saw the weapons delivery system. It was very clever. It consisted of setting a culture dish full of a particular nasty weapon in a little box, closing the door on the box, and then pressing a button that opened another door to the box that led outside.

"We let the wind take it from there," said Steiner. "We figure it takes about a year for a new weapon to reach Russia. But by then it's grown to a point that it's irresistible."

I asked him what the bacteria lived on. He laughed. "Anything," he said. It turns out that their basic breeding stock is a bacterium that can photosynthesize and dissolve any form of iron, both at the same time. "Whatever else we change about a particular weapon, we don't change that," Steiner said. "Our weapons can travel anywhere without hosts. Quarantines don't do any good."

Harold had an idea. I was proud of him. "If these little germs can dissolve steel, George, why the hell aren't they in here dissolving this whole installation?"

Steiner looked like he had just been hoping we'd ask that question.

"When we developed our basic breeder stock, we also developed a mold that inhibits the bacteria from reproducing and eating. The mold only grows on metal and the spores die if they're away from both plant and metal for more than one-seventy-seventh of a second. That means that the mold grows all the way around this installation—and nowhere else. My fourteenth great uncle William Westmoreland Hannamaker developed it."

"Why," I asked, "do you keep mentioning your blood relationship to these inventors? Surely after eight hundred years here everybody's related?"

I thought I was asking a simple question. But G.W. Steiner looked at me coldly and turned away, leading us to the next room.

We found bacteria that processed other bacteria that processed still other bacteria that turned human excrements into very tasty, nutritious food. We took their word for the tasty. We were still eating recycled us through the tubes in our suit. And we kind of wondered if their recycled excrement was tastier than ours.

They had bacteria that without benefit of sunlight processed carbon dioxide and water back into oxygen and starch. So much for photosynthesis.

And we got a list of what shelf after shelf of weapons could do to an unprepared human body. If somebody ever broke all those jars on Núncamais or Pennsylvania or Kiev, everybody would simply disappear, completely devoured and incorporated into the life systems of bacteria and viruses and trained amino acid sets.

No sooner did I think of that, than I said it. Only I didn't get any farther than the word *Kiev*.

"Kiev? One of the colonies is named Kiev?"

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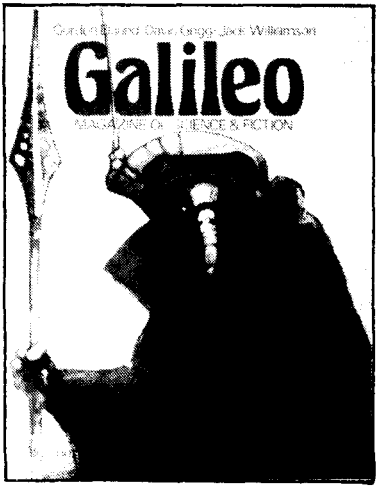

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I shrugged. "There are only three planets colonized. Kiev, Pennsylvania, and Núncamais."

"*Russian* ancestry?"

Oops, I thought. Oops is an all-purpose word standing for every bit of profanity, blasphemy, and pornographic and scatological exculpation I could think of.

The guided tour ended right then.

Back in our bedroom, we became aware that we had somehow dissolved our hospitality. After a while, Harold realized that it was my fault.

"Captain, by damn, if you hadn't told them about Kiev we wouldn't be locked in here like this!"

I agreed, hoping to pacify him, but he didn't calm down until I used the discipliner button in my monkey suit.

Then we consulted the computers.

Mine reported that in all we had been told, two areas had been completely left out: While it was obvious that in the past the little people had done extensive work on human DNA, there had been no hint of any work in that field today. And though we had been told of all kinds of weapons that had been flung among the Russians on the other side of the world, there had been no hint of any kind of limited effect antipersonnel weapon *here*.

"Oh," Harold said. "There's nothing to stop us from walking out of here anytime we can knock the door down. And I can knock the door down any time I want to," he said, playing with the buttons on his monkey suit. I urged him to wait until all the reports were done.

Amauri informed us that he had gleaned enough information from their talk and his monkey-eyes that we could go home with the entire science of DNA recombination hidden away in our computer.

And then Vladimir's suit played out a holomap of Post 004.

The bright green, infinitesimally thin lines marked walls, doors, passages. We immediately recognized the corridors we had walked in throughout the morning, located the laboratories, found where we were imprisoned. And then we noticed a rather large area in the middle of the holomap that seemed empty.

"Did you see a room like that?" I asked. The others shook their heads. Vladimir asked the holomap if we had been in it. The suit answered in its whispery monkey-voice: "No. I have only delineated the unpenetrated perimeter and noted apertures that perhaps give entry."

"So they didn't let us in there," Harold said. "I knew the bastards were hiding something."

"And let's make a guess," I said. "That room either has something to do with antipersonnel weapons, or it has something to do with human DNA research."

We sat and pondered the revelations we had just had, and realized they didn't add up to much. Finally Vladimir spoke up. Trust a half-bunny to come up with the idea where three browns couldn't. Just goes to show you that racial theory is a bunch of waggy-woggle.

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All they have to do is open a little hole in our suits and let the germs in."

"Our suits close immediately," Amauri said, but then corrected himself. "I guess it doesn't take long for a virus to get through, does it?"

Harold didn't get it. "Let one of those bunnies try to lay a knife on me, and I'll split him from ass to armpit."

We ignored him.

"What makes you think there are germs in here? Our suits don't measure that," I pointed out.

Vladimir had already thought of that. "Remember what they said. About the Russians getting those little amino-acid monsters in here."

Amauri snorted. "Russians."

"Yeah, right," Vladimir said, "but keep the voice down, viado."

Amauri turned red, started to say, "Quem é que cê chama de viado!"—but I pushed the discipliner button. No time for any of that crap.

"Watch your language, Vladimir. We got enough problems."

"Sorry, Amauri, Captain," Vladimir said. "I'm a little wispy, you know?"

"So's everybody."

Vladimir took a breath and went on. "Once those bugs got in here, 004 must have been pretty thoroughly permeable. The, uh, Russians must've kept pumping more variations on the same into Post 004."

"So why aren't they dead? Why haven't they sterilized? We know that they *can*."

viruses—well, how do you kill something that isn't alive, strictly speaking? What I think is that a lot of these people *have* been killed—but the survivors are the ones whose bodies took readily to those plugs they came up with. Maybe the plugs are regular parts of the body chemistry. They'd have to be, wouldn't they? They told us they were passed on in the DNA transmitted to the next generation."

I got it. So did Amauri, who said, "So they've had seven or eight centuries to select for adaptability."

"Why not?" Vladimir asked. "Didn't you notice? Eleven researchers on developing new weapons. And only two on developing new defenses. They can't be *too* worried."

Amauri shook his head. "Oh, Mother Earth. What ever got into you?"

"Just caught a cold," Vladimir said, and then laughed. "A virus. Called humanity."

We sat around looking at the holomap for a while. I found four different routes from where we were to the secret area—if we wanted to get there. I also found three routes to the exit. I pointed them out to the others.

"Yeah," Harold said. "Trouble is, who knows if those doors really lead into that unknown area? I mean, what the hell, three of the four doors might lead to broom closets or service stations."

A good point.

We just sat there, wondering whether we should head for the Polly-

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wog or try to find out what was in the hidden area, when the Russian attack made up our minds for us. There was a tremendous bang. The floor shook, as if some immense dog had just picked up Post 004 and given it a good shaking. When it stopped the lights flickered, went out.

"Golden opportunity," I said into the monkey-mouth. The others agreed. So we flashed on the lights from our suits and pointed them at the door. Harold suddenly felt very important. He went to the door and ran his magic flipper finger all the way around the door. Then he stepped back and flicked a lever on his suit.

"Better turn your backs," he said. "This can flash pretty bright."

Even looking at the back wall the explosion blinded me for a few seconds. The world looked a little green when I turned around. The door was in shreds on the floor, and the doorjamb didn't look too healthy.

"Nice job, Harold," I said.

"Gracias a deus," he answered, and I had to laugh. Odd how little religious phrases refused to die, even with an irreverent filho de punta like Harold.

Then I remembered that I was in charge of order-giving. So I gave.

The second door we tried led into the rooms we wanted to see. But just as we got in, the lights came on.

"Damn. They've got the station back in order," Amauri said. But Vladimir just pointed down the corridor.

The pea soup had gotten in. It was oozing sluggishly toward us.

"Whatever the Russians did, it must have opened up a big hole in the station." Vladimir pointed his laser finger at the mess. Even on full power, it only made a little spot steam. The rest just kept coming.

"Anyone for swimming?" I asked. No one was. So I hustled them all into the not-so-hidden room.

There had been some little people in there, cowering in the darkness. When the lights came on, Harold had wrapped them in cocoons and stuck them in a corner. So we had time to look around.

There wasn't that much to see, really. Standard lab equipment, and then thirty-two boxes, about a meter square. They were under sunlamps. We looked inside.

The animals were semisolid looking. I didn't touch one right then, but from the sluggish way it sent out pseudopodia, I concluded that the one I was watching, at least, had a rather crusty skin—with jelly inside. They were all a light brown—even lighter than Vladimir's skin. But there were little green spots here and there. I wondered if they photosynthesized.

"Look what they're floating in," Amauri said, and I realized that it was pea soup.

"They've developed a giant amoeba that lives on all the other microorganisms, I guess," Vladimir said. "Maybe they've trained it to carry bombs. Against the Russians."

At that moment Harold began firing his arsenal, and I noticed that the little people were gathered at the door

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to the lab, looking agitated. A few at the front were looking dead.

Harold probably would have killed all of them, except that we were still standing next to a box with a giant amoeba in it. When he screamed, we looked and saw the creature fastened against his leg. Even as we watched, Harold fell, the bottom half of his leg dropping away as the amoeba continued eating up his thigh.

We watched just long enough for the little people to grab hold of us in sufficient numbers that resistance would have been ridiculous. Besides, we couldn't take our eyes off Harold.

At about the groin, the amoeba stopped eating. It didn't matter. Harold was dead anyway—we didn't know what disease got him, but as soon as his suit had cracked he started vomiting. There were pustules all over his face. In short, Vladimir's guess about the virus content of Post 004 had been pretty accurate.

And now the amoeba formed itself into a pentagon. Five very smooth sides, the creature sitting in a clump on the gaping wound that had once been a pelvis. Suddenly, with a brief convulsion, all the sides bisected, forming sharp angles, so that now there were ten sides to the creature. A hairline crack appeared down the middle. And then, like jelly sliced in the middle and finally deciding the split, the two halves slumped away on either side. They quickly formed into two new pentagons, and then they relaxed into pseudopodia again, and continued devouring Harold.

"Well," Amauri said. "They *do* have an antipersonnel weapon."

When he spoke, the spell of stillness was broken, and the little people had us spread on tables with sharp-pointed objects pointed at us. If any one of those punctured a suit even for a moment, we would be dead. We held very still.

Richard Nixon Dixon, the top halibut, interrogated us himself. It all started with a lot of questions about the Russians, when we had visited them, why we had decided to serve them instead of the Americans, etc. We kept insisting that they were full of crap.

But when they threatened to open a window into Vladimir's suit, I decided enough was enough.

"Tell 'em!" I shouted into the monkey-mouth, and Vladimir said, "All right," and the little people leaned back to listen.

"There *are* no Russians," Vladimir said.

The little people got ready to carve holes.

"No, wait, it's true! After we got your homing signal, before we landed, we made seven orbital passes over the entire planet. There is absolutely no human life anywhere but here! Believe me!"

"Commie lies," Richard Nixon Dixon said.

"God's own truth!" I shouted. "Don't touch him, man! He's telling the truth! The only thing out there over this whole damn planet is that pea soup! It covers every inch of land and

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every inch of water, except a few holes at the poles."

Dixon began to feel a little confused, and the little people murmured. I guess I sounded sincere.

"If there aren't any people," Dixon said, "where do the Russian attacks come from?"

Vladimir answered that one. For a bunny, he was quick on the uptake. "Spontaneous recombination! You and the Russians got new strains of every microbe developing like crazy. All the people, all the animals, all the *plants* were killed. And only the microbes lived. But you've been introducing new strains constantly, tough competitors for all those beasts out there. The ones that couldn't adapt, died. And now that's all that's left—the ones who adapt. Constantly."

Andrew Jackson Wallichinsky, the head researcher, nodded. "It sounds plausible."

"If there's anything we've learned about commies in the last thousand years," Richard Nixon Dixon said, "it's that you can't trust 'em any farther than you can spit."

"Well," Andy Jack said, "it's easy enough to test them."

Dixon nodded. "Go ahead."

So three of the little people went to the boxes and each came back with an amoeba. In a minute it was clear that they planned to set them on us. Amauri screamed. Vladimir turned whiter. I would have screamed but I was busy trying to swallow my tongue.

"Relax," Andy Jack said. "They won't hurt you."

"Acredito!" I shouted. "Like it didn't hurt Harold!"

"Harold was killing people. These won't harm you. Unless you were lying."

Great, I thought. Like the ancient tests for witches. Throw them in the water, if they drown they're innocent, if they float they're guilty so kill 'em.

But *maybe* Andy Jack was telling the truth and they wouldn't hurt us. And if we refused to let them put those buggers on us they'd "know" we had been lying and punch holes in our monkey suits.

So I told the little people to put one on me only. They didn't need to test us all.

And then I put my tongue between my teeth, ready to bite down hard and inhale the blood when the damn thing started eating me. Somehow I thought I'd feel better about going honeyduck if I helped myself along.

They set the thing on my shoulder. It didn't penetrate my monkey suit. Instead it just oozed up toward my head.

It slid over my face plate and the world went dark.

"Kane Kanea," said a faint vibration in the face plate.

"Meu deus," I muttered.

The amoeba could talk. But I didn't have to speak to answer it. A question would come through the vibration of the face plate. And then I would lie there and—it knew my answer. Easy as pie. I was so scared I defecated and urinated twice during the interview. But my imperturbable monkey suit

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cleaned it all up and got it ready for breakfast, just like normal.

And at last the interview was over. The amoeba slithered off my face plate and returned to the waiting arms of one of the little people, who carried it back to Andy Jack and Ricky Nick. The two men put their hands on the thing, and then looked at us in surprise.

"You're telling the truth. There are no Russians."

Vladimir shrugged. "Why would we lie?"

Andy Jack started toward me, carrying the writhing monster that had interviewed me.

"I'll kill myself before I let that thing touch me again."

Andy Jack stopped in surprise. "You're still afraid of that?"

"It's intelligent," I said. "It read my mind."

Vladimir looked startled, and Amauri muttered something. But Andy Jack only smiled. "Nothing mysterious about that. It can read and interpret the electromagnetic fields of your brain, coupled with the amitron flux in your thyroid gland."

"What *is* it?" Vladimir asked.

Andy Jack looked very proud. "This one is my son."

We waited for the punch line. It didn't come. And suddenly we realized that we had found what we had been looking for—the result of the little people's research into recombinant human DNA.

"We've been working on these for years. Finally we got it right about four years ago," Andy Jack said. "They were our last line of defense. But now that we know the Russians are dead—well, there's no reason for them to stay in their nests."

And the man reached down and laid the amoeba into the pea soup that was

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now about sixty centimeters deep on the floor. Immediately it flattened out on the surface until it was about a meter in diameter. I remembered the whispering voice through my face plate.

"It's too flexible to have a brain," Vladimir said.

"It doesn't have one," Andy Jack answered. "The brain functions are distributed throughout the body. If it were cut in forty pieces, each piece would have enough memory and enough mind function to continue to live. It's indestructible. And when several of them get together, they set up a sympathetic field. They become very bright, then."

"Head of the class and everything, I'm sure," Vladimir said. He couldn't hide the loathing in his voice. Me, I was trying not to vomit.

So this is the next stage of evolution, I thought. Man screws up the planet till it's fit for nothing but microbes—and then changes himself so that he can live on a diet of bacteria and viruses.

"It's really the perfect step in evolution," Andy Jack said. "This fellow can adapt to new species of parasitic bacteria and viruses almost by reflex. Control the makeup of his own DNA consciously. Manipulate the DNA of other organisms by absorbing them through the semipermeable membranes of specialized cells, altering them, and setting them free again."

"Somehow it doesn't make me want to feed it or change its diapers."

Andy Jack laughed lightly. "Since they reproduce by fission, they're never infant. Oh, if the piece were too small, it would take a while to get back to adult competence again. But otherwise, in the normal run of things, it's always an adult."

Then Andy Jack reached down, let his son wrap itself around his arm, and then walked back to where Richard Nixon Dixon stood watching. Andy Jack put the arm that held the amoeba around Dixon's shoulder.

"By the way, sir," Andy Jack said. "With the Russians dead, the damned war is over, sir."

Dixon looked startled. "And?"

"We don't need a commander anymore."

Before Dixon could answer, the amoeba had eaten through his neck and he was quite dead. Rather an abrupt coup, I thought, and looked at the other little people for a reaction. No one seemed to mind. Apparently their superpatriotic militarism was only skin deep. I felt vaguely relieved. Maybe they had something in common with me after all.

They decided to let us go, and we were glad enough to take them up on the offer. On the way out, they showed us what had caused the explosion in the last "Russian" attack. The mold that protected the steel surface of the installation had mutated slightly in one place, allowing the steel-eating bacteria to enter into a symbiotic relationship. It just happened that the mutation occurred at the place where the hydrogen storage tanks rested against the wall. When a hole opened,

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one of the first amino acid sets that came through with the pea soup was one that combines radically with raw hydrogen. The effect was a three-second population explosion. It knocked out a huge chunk of Post 004.

We were glad, when we got back to our skipship, that we had left dear old Pollywog floating some forty meters off the ground. Even so, there had been some damage. One of the airborne microbes had a penchant for lodging in hairline cracks and reproducing rapidly, widening microscopic gaps in the structure of the ship. Nevertheless, Amauri judged us fit for takeoff.

We didn't kiss anybody good-bye.

So now I've let you in on the true story of our visit to Mother Earth back in 2810. The parallel with our current situation should be obvious. If we let Pennsylvania get soaked into this spongy little war between Kiev and Núncamais, we'll deserve what we get. Because those damned antimatter conversors will do things that make germ warfare look as pleasant as sniffing pinkweeds.

And if anything human survives the war, it sure as hell won't look like anything we call human now.

And maybe that doesn't matter to anybody these days. But it matters to me. I don't like the idea of amoebas for grandchildren, and having an antimatter great-nephew thrills me less. I've been human all my life, and I like it.

So I say, turn on our repressors and sit out the damned war. Wait until they've disappeared each other, and then go about the business of keeping humanity alive—and human.

So much for the political tract. If you vote for war, though, I can promise you there'll be more than one skipship heading for the wild black yonder. We've colonized before, and we can do it again. In case no one gets the hint, that's a call for volunteers, if, as, and when. Over.

Not over. On the first printing of this program, I got a lot of inquiries as to why we didn't report all this when we got back home. The answer's simple. On Núncamais it's a capital crime to alter a ship's log. But we had to.

As soon as we got into space from Mother Earth, Vladimir had the computer present all its findings, all its data, and all its conclusions about recombinant DNA. And then he erased it all.

I probably would have stopped him if I'd known what he was doing in advance. But once it was done, Amauri and I realized that he was right. That kind of merda didn't belong in the universe. And then we systematically covered our tracks. We erased all reference to Post 004, eradicated any hint of a homing signal. All we left in the computer was the recording of our overflight, showing nothing but pea soup from sea to soupy sea.

And then we recorded in the ship's log, "Planet unfit for human occupancy. No human life found."

Hell. It wasn't even a lie. ■

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Darwin says I'm not humane. The truth is, I have no time to be. With the premen in revolt, rising in their apish ignorance to kill the Creators and stop creation, I've no emotion to waste on his simian backwardness.

He has always vexed me. His unendurable assumption that his technical fatherhood gives him a right of command, when he should remember that he made me superior. His recurrent loss of faith in our mission to reshape the universe of life. Worst of all, his relative stupidity.

Or am I too arrogant?

After all, he's my own designer. And I should try to keep in mind his desperate tension now, with the preman hordes overwhelming our loyal trumen everywhere. Often near the breaking point. Warning our clone commanders that we can't defend the clinic. Already preparing a secret retreat in an abandoned copper mine.

Our old conflict came to a crisis today. An ugly confrontation in the mutation lab. Perhaps I was unduly harsh, but I've tolerated his incompetence too long. His stunning intellectual blindness—more provoking, even, than his moral cowardice.

Where I perceived serendipity—the dazzling reward, in fact, of his own long lifetime of effort to invent something better than himself—all he could see was baffling mischance and a monster of miscreated danger.

It came from his own pet project, one he had begun long before I was born. An endless experiment with recombinant DNA. A random resplicing of human genes with macromolecules scraped off deep-space meteors—he likes to call it stochastic creation. Marrying our human stuff with protolife older than the galaxy.

Typical of him. His aim was grand enough: to create cosmic man. His method all blind blunder. Throwing genetic dice, year after year after year, many billion times, with no more logical grasp of his program than actual definition of his goal. Never really knowing what he was looking for, he couldn't recognize it when he found it.

That happened today. His truman helpers brought him a little pink stain out of the new autoclave. Live cells on a Petri dish they had tried to sterilize. Anomalous stuff, shining in the dark with a faint pink aura. It refused to die. A problem for the lab crew, because of all their safety guidelines.

The worst possible time, they told him, to let any stray creations escape. An accidental plague could attack our own too-few defenders and inflame more premen against us. Insanely accepting that, Darwin tried to help them kill the culture—he called it "an adventitious neoblast."

Spent hours at it, in fact, before he brought the dish to me. Said he had cooked those outlaw cells again in the autoclave, in the strongest acids he could find. And in the strongest alkalis. Said he couldn't burn them off the dish. Said he couldn't scrape them off, because they somehow flowed around his scalpel. Said they somehow reflected X-rays intended to destroy

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them. Said he couldn't even change their temperature.

When I laughed at that, he had them dipped in a beaker of liquid nitrogen. Frost crackling over all the dish when he pulled them out, except on that one pink spot. Still 36.7° C, when we put a thermograph microprobe on it.

"Can you make sense of this?"

His tormented question wasn't meant for me. Fingers quivering, he was leafing through a thick sheaf of computer printouts on the batch of mutations from which the culture must have come.

"Another nothing lot." He bent to squint at his data. "Not one specimen worth a second glance. We dumped them all last night and sterilized the lab—or tried to." At last, miserably, he looked up at me. "What can we do with it?"

On top of all his other crises, this was too much for him. He was white and shaking by then, infected with his helpers' panic. Thinking how to dispose of the culture if it couldn't be destroyed. Could we fuse it into glass, seal the glass in stainless steel, bury that in concrete? Or should we load it on a rocket and shoot it into the sun?

"Give it to me," I told him. "It may be our best creation."

"It's nothing I ever meant to make." His eyes were fixed on that little dish in a sort of horror, as if it held poison he had already swallowed. "I can't understand it and I'm afraid to keep it. It violates natural law—"

"Perhaps because it respects some higher law that we should learn," I told him. "Keeping warm in that cryogenic bath, it does seem to break the laws of thermodynamics—but those are merely statistical. Perhaps you have created Maxwell's famous demon."

"We need no demons!"

He didn't want to trust me, but I had to have those rebel cells. The battle went on till I got them. Perhaps I became too candid about his intellectual limitations, because he was crying when he threw the dish at me and ran out of the lab.

I don't yet know what can be done with them, but the outlook dazzles me. They're half-human, half-eternal. Demoniac or not, they evidently want to be immortal. If I can build them into viable parahuman embryos, they could be seed for literal gods.

Contemplating that, I can't help pausing. Can we trust such gods to be any more humane than I am? Will they feel bound by any sense of moral obligation to their creators? Or will they be as arrogant to us as I must have seemed to poor old blindly blundering Darwin?

—Voicetrack recovered from
laboratory computer of
Huxley Smithwick.

1.

The god of Earth had convened a special congress of divinity, calling selected neighbor lords to his holiest temple, a monument to Thar, his own aspect as wisdom. All black granite, the temple crowned an Asian peak too

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high for trumen. The builders had been Martian mumen, who had left it centuries ago to the wind and the cold and the gods.

Leaving his sacred skimmer at a field far down the mountain, he levitated there alone. His nimbus glowing orange-red against the chill, he sat high on his great black throne beneath the shimmering star-charts that lined the vault.

His guests were there in transvolutionary images, their auras lighting a wide arc of the transceiver columns around him with a dance of rainbow color. Nearly all were younger, several his own descendents. Most of them revered him as an elder god and a hero of the legendary war to destroy the Creators.

Less worshipful, the child goddess Zhondra Zhey had chosen a pillar a little apart from the others, her pearl-hued nimbus almost invisibly pale. She was there by his express command, her image sent from her charter craft in space.

Between those enormous communicator columns, the temple was open to a stormy sky. Thick fog hid everything outside. Bitter winds moaned through the dome, driving crackling sleet against Belthar's throne.

"Fellow Lords, I have nothing good to share with you." His mood matched the storm. "You are a selected group, invited here because the worlds you rule were hostile once. Their stubborn native creatures had to be exterminated, and you became master killers.

"We need exterminators now."

Though his listeners were light-years away in the space-time of Earth, or some of them in farther universes, they were close enough in the multiversal contact net to hear the howling wind and sense Belthar's brooding wrath. Their living images murmured and stirred, auras colored with their reactions of wonder or resentment or alarm. Zhondra Zhey flashed a bright protest, but he ignored her.

"Why trouble us?"

Cynthara didn't wait for recognition. Splendid in her emerald aura, she was his sister and a fellow veteran of that ancient war, her sleek beauty still unwithered by ten centuries of time. She had been his consort once, before she reclaimed her own first planet from its furious defenders, and their daughter smiled at him from the transceiver beside her.

"Bel, are you bored with your old dominion here?" She let the green nimbus drop, as if to challenge him with a glimpse of her undimmed magnificence. "Are you planning to claim another sun? Or have you been alarmed by some chimera on the desert planets of Sol?"

"Neither." Scorning the challenge, he smiled at his fire-clad daughter, his nimbus rippling an invitation for her to visit her mother's bed. "The enemy is ours—yours as much as mine. And kin to all of us."

Apprehension dimmed his daughter's first radiant response, the color fading from her golden halo.

"You know the history of our war to save ourselves." He turned to the oth-

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ers, his own aura flaming against another bitter blast. "Fought because the last Creators were trying to undo their own most noble work—jealous, no doubt, of the immortality and power and perfection they had given us.

"We killed Eva Smithwick and all her ill-begotten crew. We believed at the time that we had aborted her monstrous Fourth Creation—the creatures she had designed, in her sick senility, to supplant the gods. We demolished her genetic laboratories and sterilized the whole region around them with nuclear fire. We tortured every technician we could catch, for every fact he knew. We located and burned every known unholy creation. We searched the whole planet for more, until we had erased every trace of Eva's folly—or so we thought.

"In fact, we should have killed every preman."

Protest lit half the pillars, and Zhondra Zhey's pale aura burned blue with indignation.

"Our father race?" That angered shout rang from the image of Kranthar, his sole surviving brother and his chief lieutenant in the war, his rival once for Cynthara, though she had long ago left them both. "Would you yourself repeat Eva's blunder?"

"True, the premen were our fathers." He let his nimbus lick a warning tongue at Kranthar. "But that was fifteen centuries ago. Today, they are a breed of miserable vermin—but somehow hatching those same monsters that Eva created to replace us."

"Have you proof?"

"Proof enough." Grief dulled his halo, and wrath streaked it with crimson. "My son is dead."

Shaken, they listened.

"The legend has always been alive among them. The legend of an ultiman or multiman who would in time arise to restore all the greatness they imagined they had lost. I first heard of the myth soon after the war, but I was not concerned about it then—the premen had never trusted the Creators, never loved the trumen or the mumen, never respected me or given up the worship of their old imaginary gods, never stopped expecting to be rescued by their own half-divine messiahs."

The storm around the peak had grown more savage. Driving snow blurred the star-maps overhead and veiled the transceiver columns.

"I did take precautions." He raised his voice against a bitter gust that screeched through the pillars and moaned around his throne. "I set up an efficient Inquisition, instructed to seize every preman who displayed any doubt about my own divine supremacy. Over the centuries, tens of millions were burnt."

"Too many, perhaps?" Kranthar snorted. "If the survivors don't love you, that could be why."

"Too few. No matter how many my inquisitors killed, the legend always found new believers. Six centuries ago, as most of you ought to recall, I proposed a logical solution."

"I remember." Cynthara's nimbus flared green with accusation. "You wanted to kill them all." She nodded

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at Kranthar. "We vetoed your scheme."

"Because of our own obligations." Old antagonisms flared in Kranthar's aura. "The premen had been our allies. Without the millions of lives they spent, we might have lost the war. We can't forget our promise—friendship forever."

"A treaty with premen—"Belthar shrugged his contempt. "I might have ignored your sentimental quibbles, but my own trumen churchmen prayed for the premen, because they still formed most of our labor force and produced most of our food. Their immediate extermination would have resulted in severe economic dislocations."

Kranthar grinned. "Is your friendship better than your enmity?"

"They never accepted me." He swept the glints of irritation from his nimbus. "They clung to their own foolish faiths and folkways. Living in the myths of their lost past, they never found—never wanted—any place in my Thearchy. With no dignity left, no pride, they became worthless parasites. A dying race—"

"Perhaps you helped them die."

"If help can kill." Belthar shrugged. "We gave them reservations—lands to call their own. We gave them food and care. We tried to share our true culture with them. Every effort failed. They never forgot that they had once owned all the planet. The nearer they came to racial death, the more stubbornly they clung to the blasphemous notion that a new messiah would be born among them to overwhelm the gods and restore the splendor they imagined they had once possessed. It was my own unfortunate mortal son, serving as my Arch-Inquisitor, who found what seemed to be the perfect final solution for the preman problem. With my approval, he chartered Zhondra's ship to relocate them on Andoranda Five—"

"I didn't know!" Her aura blazed a brighter blue. "I wasn't told about that planet. The ugliest world there is. It never evolved dryland life, and your monks failed to terraform it. Terran can't increase there."

"The beauty of it." Belthar smiled reproof through scarlet sparks. "So Quelf persuaded me. His scheme gave us an ultimate practical solution of the preman question in a single generation, with no infraction of those precious treaty rights. But the plan has gone badly."

He waited through another blast of blinding snow.

"That blasphemous myth of the ultiman was more than just a myth. It turns out now that Eva tricked us. The sleeping beings we found and destroyed in that forgotten copper mine were only decoys. Her actual Fourth Creation was more cleverly concealed."

Hues of surprise and dismay colored the columns.

"In the genes of the premen!" His anger bellowed, wild as the wind. "Demoniac mutations, designed for our destruction! Lying unsuspected in the cells of that dying race for a thousand

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years. Quelf's plan forced them out of hiding.

"He trapped two young demons, born on the last reservation. When he tried to burn them, their power was revealed. They murdered him—brutally! And somehow escaped."

His nimbus dimmed until he shivered.

"They terrify me. They should terrify you. Because we had planned the burning with every precaution to make sure of them. The male had been drugged, disarmed, and isolated under heavy guard in a cell many miles from the female, who was also drugged. They were to be burned simultaneously, without warning, with no chance for mutual aid.

"Yet somehow the male got out of his cell and reached the female—at the very instant she was to die. He killed Quelf with his own laser dagger. They both disappeared. The clone chief survived, but he can't explain what happened or where they went. Except to suggest that they are actual demons, with transvolutionary powers."

His aura flared against a blast of sleet.

"Demons they are. Eva's Fourth Creation, in a guise of diabolical innocence. They look like ordinary premen, still only in their teens. A slim, tow-haired boy. A dark-haired girl—lovely enough, the inquisitors reported, to be a bride for me. Unless we find and burn them, they could kill us all."

"Are you afraid of them?"

Zhondra Zhey had drawn back from him, her aura cold as her tone. Slashing at her with a tongue of crimson fire, he spoke to the rest with a fleeting smile of divine superiority.

"They were cunning enough to deceive Zhondra. She has coddled them since they were infants, and recently she has been begging my permission to find a kinder planet for them and their people. I'm commanding her to help us run them down."

2.

He carried her off the windy pinnacle where they had arrived on Andoranda Five. Sliding down a treacherous slope, he caught his balance on a narrow blade of sand-worn stone. She shuddered in his arms.

"We're okay, Bug," he gasped. "When we find our people."

"If—"

Her troubled whisper sank into a sigh, and she hung limp against him, her breath sour with the godsgrace drug. When the slippery trail grew wide enough, he bent to lay her down in the lee of a rocky knob and rose to get his breath.

He was suddenly weak and trembling, shaking with a delayed reaction. Somehow, he had won that desperate fight with Belthar's son. Somehow, they had escaped the Inquisition forces closing in on Redrock castle—somehow jumping across or around the unimaginable gulfs outside of Earth's space and time to reach this unkind asylum.

Elation, for a moment, had lifted

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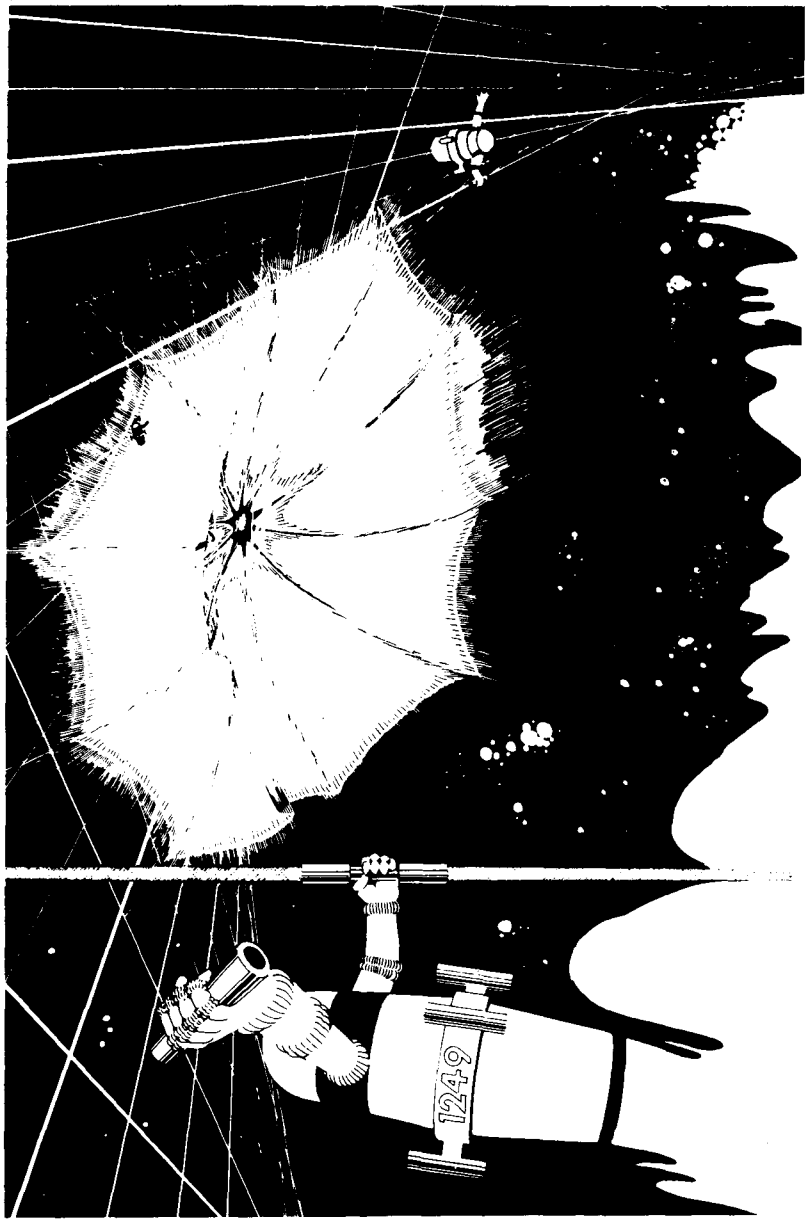

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him high. But the effort of that transvolutionary leap had somehow drained the latent energies that still he didn't understand. He was suddenly shivering with the sweat of weakness, and his head ached where Quelf's demon-burner had grazed it.

He looked down at Buglet. Liquid midnight, her hair spilled over the boulder under her head. Half-closed, her yellow eyes saw nothing. Her gauzy bridal gown, like his own gray prison rag, was too thin for the whipping wind, and her fine skin was already blue with cold. Pity stabbed him.

He stooped to move her farther into the shelter of the rock and saw odd seams across it—crudely mortared joints. Only then did he see that the little knob was artificial, built of rough black lava masses piled up to form circular walls and a crowning dome. The shape of it chilled him.

A chapel of Thar!

His last spark of triumph died, as if the vengeful gods had already overtaken them. Blind panic urged him to pick Buglet up and run. Fighting that, he walked around to the doorway and peered uneasily inside.

All he found was a dark little cave, sifted with years of wind-drifted dust. The altar was only a granite block, roughly squared. There was no transceiver for any actual divine contact—he tried to cheer himself that Belthar's aura certainly couldn't reach into this remote universe. The chapel, surely, was merely symbolic.

He caught a dull metal glint beyond the altar and read a black-lettered legend on a tarnished slab, beneath the triple triangle of the Thearchy:

ERECTED TO THE WISDOM OF BELTHAR
IN THE YEAR 903 OF HIS GLORY
BY THE HOLY ORDER OF POLARIS

The date was almost a century ago. The chapel must have been the first project of the Polarian monks when they landed to reclaim the planet for Terran life. The task had been too much for them, and he recoiled now from the piercing chill in that dusty chamber as if it had been their tomb.

"Davey—" Buglet was whimpering his name. "I'm so cold—"

"I'll look for help," he told her. "I'll find somebody."

"Nobody—" Her teeth were chattering. "Nobody—"

He left her lying there and limped down toward the terraforming station the monks had built. The rocky trail hurt his bare feet, and his body felt too heavy. Breathing hard, he began to recall what he had read in truman books about Andoranda Five.

Its gravity was a quarter stronger than Earth's. For want of land plants, its air was poor in oxygen. Its day was hardly a third of Earth's, but the year was nine times as long. Its orbit was highly eccentric, causing seasons the monks had found too severe for any sort of dryland life. When their relief ship came back, they had left it gladly.

No ship would ever come to take the preman exiles to any better world, but he groped for crumbs of hope. Chilled as he felt, the season must still be summer. Or only spring, perhaps,

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with several years of Terran time before the killing winter. Time enough, with luck, for him and Buglet to discover and control their latent powers—if they could live to find help.

But that must come soon. His feet were already nearly too numb to feel the knife-sharp rocks, and his whole body shook with cold. He couldn't carry Buglet much farther, or keep moving long.

From a bend in the trail, he could see the station, far below and oddly unchanged from the way it had looked on truman wallscreens—it still matched the mental image that had somehow brought them here. The broken circle of metal huts, yellow dots against dust-reddened snow. The narrow landing strip the monks had cut into the foot of the ridge. The rock-free streaks they had cleared for roads.

But where were the premen?

Dread stabbed him, a cold steel blade. Zhondra Zhey's transvolutionary ship should have left them here months ago, but the long drifts across the strip showed no skidmarks from any landing shuttle. Nothing had tracked the snow on the roads. Nothing moved anywhere.

Could she have landed them somewhere else? Looking away toward the wild horizon, he saw the vast mud-yellowed river, rafted here and there with dirty ice, foaming against treeless banks, winding off into dim infinity. Saw the endless mud-flats its floods had left, unmarked by anything. Saw the mountain ranges lifting far beyond it, dark and dead, veiled in yellow dust.

For a moment he stood there frozen, chilled to the bone with a sense of death. He longed to hear a bird call, to catch a flower scent, to see a hint of green anywhere. But, save for its strange seas, this world had never lived. The monks had failed to fit it for any kind of Terran life, and he saw no hint of the premen anywhere.

When he tried to move, that spell of death held on, promising to blunt the wind's cruel bite, to ease all his fears and end the tension of trouble. Clinging grimly to life, he shook himself free and climbed back to Buglet. She was sitting up against the chapel wall, and her trustful smile warmed him.

"Take me, Davey." Her voice was slow and sleepy, muffled with the drug. "I'm so cold, Davey." She raised her blue bare arms, like a frightened child. "Take me to our people."

"I can't—" His voice broke, because he hated to hurt her. "—can't find anybody." He caught her cold hands. "And I don't know anywhere to go. Getting us here was an accident, really. I don't know how to make it happen again."

"Please!" she begged. "My head aches so."

"The drug," he told her. "But you must walk, if you can. We must get to the station. To some kind of shelter."

"Try—" she breathed. "Let me try."

He pulled, and she came trembling to her feet. Leaning on him, moaning

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when the rocks were sharp, she stumbled with him down the trail. Beyond the shelter of the chapel, bitter gusts set them both to shivering again. When they came to the bend above the station, she sank back against him.

"Sorry!" she sobbed. "Too cold. Too far. Too much snow." She clung to him, wet eyes pleading. "Can't you—can't you just jump us there? The way you did from Redrock?"

"Don't know how." He hugged her against him, trying to warm her. "I still don't understand. But I think I used something up, to get us here. It will come back—I hope! But now we have to walk."

"Walk," she echoed drowsily. "If we can—"

They limped on down.

"Davey!" She stopped at another turning of the trail, breathless with delight. "A skimmer!"

Its weathered metal nearly the color of the dust-streaked snow, it lay just off the end of the strip. Hope soaring, they struggled on until he could see the long drift behind it and the Polarian bear outlined on the uptilted tail in faded blue paint.

"Only a wreck." He felt sick. "The monks crashed it and left it."

"But what's that? That yellow thing?"

Blue hand shaking, she pointed at a narrow yellow pod he hadn't seen, lying in a wind-blown hollow nearer the strip.

"Survival gear!" He stared, hardly daring to believe. "The monks at Redrock showed me a pod like that on one of their skimmers. Things the pilot might need if he had to eject."

He floundered to it. *Emergency only!* The words ran along a pointing arrow. *Open here.* His fingers were only aching hooks, too stiff to catch the red plastic lever, but at last he got it with his teeth. The pod snapped open.

Inside, it smelled like the incense the monks had burned in the chapel of Thar. There were little silver-wrapped ration bricks—the fat dean had let him taste them. There was a coil of rope, a signal lantern, a chemical stove. There were two tight packs that he hoped would be clothing.

Buglet had staggered after him. He went back to help her, and they crouched together in the hollow, warming their hands over the tiny stove. When at last they could open the packs, they found yellow coveralls, complete with hoods and boots and gloves.

"Is it—real?" He stared at her across the precious gear, struck with a pang of disbelief. "Why would the monks leave all this for us?"

"Maybe they were killed." Frozen for a moment, she turned away from the wreck and tried to smile at him. "Anyhow, we're very lucky. Now we can stay alive."

The abrupt night fell while they were squirming into the survival suits. Lying huddled together in the snow hollow, they grew slowly warm enough to sleep. How long they slept, he never knew. Perhaps through two or three of the planet's fleeting days.

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Buglet woke him once, crying his name. When he snapped the lantern on, she was sitting up, staring out across the snow, eyes wide with terror.

"Just a dream," she whispered. "A dreadful dream!"

He took her in his arms. She clung to him, trembling, but she wouldn't say what she had dreamed. At last she went to sleep again. He sat watching, wondering what had terrified her, until at last the sky turned to a dusky orange-yellow.

There was no sun. Perhaps there were clouds that hid it, above the wind-blown dust. Used to reading time and direction in the clear skies of Redrock, he felt lost and bewildered.

Trying to show more cheer than he could feel, he started the stove again and melted snow to make a hot drink from a ration cube, whistling as he worked. Buglet started awake, blinking at the snow and the wreck and the bare peak behind them as if terrified again.

"Davey!" She clutched at him desperately, but in a moment she relaxed, smiling uncertainly. "I thought— but I guess we're okay now."

"You dreamed again?"

"Forget it. Let's look for our people."

The reek of godsgrace gone from her breath, she seemed almost herself again, nearly too lively, as they packed their gear and tramped on across the ice toward the clustered huts.

In hearing range, they stopped to listen. She called out, her voice tight and high. All he heard in answer was the dry wind-whine from the huts. Long drifts lay among them, dusty crusts unbroken.

"Our people—" She turned to stare at him, eyes haunted. "Why aren't they here?"

He had no reply.

Crunching through old snow, they explored the station. The huts had been left unlocked and empty, though one with windows broken was drifted deep with snow. Bedding and clothing had been taken from the dormitory. Food was gone from the kitchen, equipment from the labs, everything from the supply room.

In the lab section, they read the story of the station. Dead plants in the greenhouses, dried to brown sticks. Brown little mummies in the animal cages. Staring at them, Buglet pressed close against him.

"We're very lucky, Davey!" she whispered. "Without the pod, that's what we would be."

The headquarters hut had been marked with a metal plate that carried Belthar's triple triangle and the blue Polarian bear. The lower floor was empty, but they found a built-in desk in the glass-walled cupola that had been a weather station, faded charts still taped to its top.

"Maps!" Excitement took his breath. "Maps of the planet."

The world chart showed a single great continent—with wide white stretches and long gaps where not even the coasts had been explored. One

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huge river drained most of it, flowing to the east coast from a southwestern mountain range. Only two places were named. Station One, an ink dot near the river mouth. Station Two, on another dot on a cape beyond the mountains, at the south tip of the continent.

"We must be here." He pointed. "Where the river bends."

"Maybe they moved to Station Two." She looked at him. "Would there be a reason?"

"The weather, maybe. Two is in the other hemisphere. It would have summer of a sort, in spite of the orbit, when winter comes here."

"It must be coming now." With a little shiver, she looked out at the ice. "The goddess has taken our people to Station Two." Her grave eyes came back to him. "Can you carry us there?"

He shook his head. "I've no image to guide me."

"We have to get there."

"I don't see how." He scowled at the chart. "It looks like eight or ten thousand miles. Rivers and mountains to cross. No roads and no bridges. No food anywhere, except the little we found."

"But we must—fast!"

Her breathless desperation startled him.

"The dream I had." Her frightened eyes met his. "I didn't want to tell you, because it was so dreadful. The gods had sent a thing to kill us. A demon thing—if there are any demons."

Her icy fingers gripped his arm.

"Davey, I'm afraid! Afraid it wasn't just a dream."

3.

The storm raged against the Asian temple, wild as some ill-created monster of the chaos that prevailed before the gods were made. Blinding lightning burned behind the transceiver pillars. Thunder crashed and rolled and moaned against the high dome.

Nimbus crimson, the Lord Belthar yelled against wind and thunder, grilling Zhondra Zhey for more than she knew about the fugitive demons. How had the male got out of his cell? How had he managed to murder Quelf? How had he carried the drugged female away? Where were they now?

Her aura faint and cold, she said she didn't know.

Were there other premen who might carry the demon genes? Was it possible that they might survive on Andoranda Five? Or even escape from it, to threaten the immortal gods?

"Nothing can live there long," she answered. "Nothing except the creatures of its seas, which want no life on the land. Your own Polarians failed to defeat them. I don't think the premen can."

How long did she expect the premen to survive?

"The supplies we landed with them will be gone in half a Terran year. The cargo we carry now is not much larger, and they can't grow more. The planet is now approaching its cold aphelion. They can't live through their next long winter, unless they get relief—"

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"Relief?" His incredulous bellow pealed through the sleety fog. "They'll get no relief." He glared down at her. "I suppose it is useless to forbid you to unload the food you have aboard for them, but I'll see that you get nothing more to take them—"

Her image dimmed as if fading from the column.

"Hear me, child!" he bawled. "You belong to the race of gods. Pampering demons, you bring peril to yourself—"

"No great risk." Her aura glowed again. "I know no demons."

"We know them," Belthar boomed. "Well enough to burn them! We won't allow your sentimental follies to threaten the rest of us. In that, at least, I believe we stand united."

When his gaze swept the columns, they colored with assent.

"Hear this, my dear." He smiled paternally through scarlet sparks. "You yourself may feel no danger from your demoniac pets, but you stand in peril from us."

Silent, her image winked out.

Divinely indifferent, he turned to question his remaining guests about the weapons they had developed to clear useless native life from their own residential planets. Few of the answers pleased him.

One of Kranthar's twin sons—sons by Cynthara and so twice nephews of Belthar himself—had showered neutron bombs from space to soften the urban and industrial centers of an insectoid civilization. The other son had designed muman look-alikes to infiltrate a culture of green-winged, half-plant beings—

"It's demons we're hunting!" Impatience glared through his nimbus. "Mumen are no good against them—they've already killed mumen enough. Neutron bombs might be better—but we have to find them first."

He turned to his daughter, who sat straight in her own golden aura, blue eyes smiling as if she liked the storm and admired his eternal vigor and found some wild delight even in fighting preman demons.

Her own chosen world, Belphera said, had been still barbaric, ruled by a race of hunters. Pleased with their ferocious folkways, she had joined the game with no weapons save her own transvolutionary gifts, shifting just outside their space to make herself invisible in ambush, levitating in pursuit, killing with her nimbus.

"I hope you get to meet the demons." He grinned his approval of her own feline perfection. "But their trail may be difficult to follow."

One hostile world had been sprayed with a short-lived catalyst that utilized solar energy to fuse atmospheric nitrogen and carbon into clouds of poisonous cyanogen. Another had been seeded with a virus that consumed everything organic, leaving only sterile dust when it died.

A silver-nimbused goddess told how she had bred marine mumen to conquer a race of ecology-minded seadwellers who had left the virgin forests on their continents as a source of oxygen. The mumen located the un-

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dersea cities and guided nuclear torpedos to neutralize them.

"I had to fight a higher technology," Kranthar reported when his turn came. "The militant natives had conquered every planet of their system and begun to plan interstellar adventure. To exterminate them, my muman engineers sowed their worlds with self-replicating machines designed to attack everything that moved."

"Useful toys." Belthar nodded. "If we can find the demons."

He looked at a handsome junior god, waiting eagerly in a cloud of diamond dust.

"The world I claimed was even stranger," the youngster said. "Its aborigines were golden-winged things of the air, small and happy as children, so like us in their beauty that I felt almost reluctant to destroy them. Their symbiotic homes were great solitary fruit-bearing trees that gave them food and drink and shelter. Though they may have aided the evolution of those trees, they had no visible technology.

"I found one building—the only artificial structure on the planet. Beautiful and wonderful—the first glimpse of it almost stopped my heart. It was all precious stone and precious metal, shaped by genius and devotion into a soaring expression of the soul of the race.

"A temple, they told me, consecrated to a fantastic concept I never tried to understand. Dedicated, they said, to the creator of all the universe—it would have been the whole multiverse, I suppose, if they had ever heard of that.

"They loved and worshiped that imaginary being—an impossible deity who somehow managed to combine cosmic omnipotence with a tender personal concern for every individual worshiper. The maker and defender of all they called good. The implacable enemy of what they called evil. They called me evil!"

The young god laughed.

"They wanted me to worship him. They were so charming in their innocence and beauty that I invited them to worship me. I might have saved them, in fact, if they had ever welcomed me. But they clung instead to that ridiculous heresy.

"There was a caste of priests who had memorized a set of silly myths about their incredible god. They attempted to deny my own divinity. I believe they had begun to discover transvolutionary powers, with which they tried to protect the temple. Outraged when I burned it, they promised that their unseen god would humble me.

"All it took to humble them was a prolific mutant stinging wasp designed to lay its eggs in the blooms of those magnificent trees. The wasps spread fast. Within a year the creatures were falling like rotten fruit, stung or starved to death.

"Though I had admired the trees, they died too." Diamond glitter swirling, he shrugged off that small misfortune. "It's still a splendid planet, and

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that universal god has never troubled me."

"He never will," Belthar said. "I think the premen had some such folktale once. Not that it matters. To deal with these demons, we need something deadlier than wasps."

He bowed to Cynthara.

"At last, Bel dear! My Gleesh is the creature you need." She flowed to her feet in her mantle of emerald motes, still as sleekly pantherine as when they had been lovers. "I've always been restless, you'll recall. I've had a good many planets, and left them when they bored me. The last I took had evolved the most ferocious beings I've ever met.

"The supreme predators on a world of cruel predators. They must have come from something like the great cats of Earth, but some chance mutation had given them transvolutionary capacities. Though they had not yet reached any other stars, they had learned to jump from planet to planet in their own system, and their auras were as powerful as ours.

"Others had avoided them, but I enjoy that kind of challenge." Green sparks danced in her long pale hair when she flung it back. "I designed deadlier things to kill them out. The deadliest—"

A howling gale drowned her voice, and the blinding ice-fog dimmed her nimbus. Belthar bent forward, his own red aura blazing higher, until the blast was gone.

"Rulers of all their worlds," she went on, "they had turned to fighting one another. In ceremonial games. I got live cells from the body of a defeated champion, tossed into the sea. From those, and cells from myself, my engineers created killer things—"

Protest was blazing across the columns; in divine concord, the gods had pledged themselves to create nothing that might supplant them.

"—but not without precaution," she explained. "We made them sexless, sterile, and self-destructive. When they had done their work for me, they turned on one another. Only one is left alive, a pet I keep on the grounds of my favorite temple."

Fondly, she smiled through emerald dust.

"My beautiful Gleesh. Gentle enough with me, though it has developed a regrettable appetite for truman priests. A supreme demon, really. Quite a match, I'm sure, for your young premen. It has the extrasensory capacities to track them and the transvolutionary effectors to pursue them anywhere."

"Can it kill them?"

"If anything can." Framed in the haze of her aura and the ice, her loveliness was luminous with pride. "Gleesh is the ultimate killer, endowed with the power and the lust and the cunning to turn every defense of its prey into another weapon of its own. It would love another hunt."

"Then bring it to Earth," Belthar begged her. "We'll let it take the trail at my dead son's Redrock estate."

When his imaged guests had flashed

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their farewells and faded out of the columns, he rose from the throne and dived back through the storm of his ice-crusted skimmer, his halo ablaze with triumph. Gleesh should have no trouble with any two teenaged pre-men. Even if they had a demon taint. Even if a foolish baby goddess was attempting to befriend them.

4.

Like a black wall falling, another sudden starless night caught them in the cupola. Buglet was still haunted by her dream of the demon, afraid for both of them to sleep. He lay restless on the floor beside her, searching for some way across the cruel continent to Station Two, discovering none.

Daylight was a golden explosion.

"I had a better dream." She woke refreshed and radiant. "About how to reach our people. We'll fix that skimmer by the strip."

"A pretty wild dream." He stared at her, astonished. "If the monks couldn't repair it, how can we?"

"We need it worse than they did."

"We've no tools. No parts. No skills."

"We've got to try. Unless—" She paused, probing him. "Unless you can teleport us?"

"I can't." He shrugged unhappily. "Getting us here was a freak of luck. I still don't understand the process. I do know that it takes a clear image of the destination. Without that—"

In the yellow dawn, they took the map the monks had left and slogged back to the shuttle strip. Dismay checked him when he saw the wreck again, all of it except the tilted tail buried under old snow and wind-blown dust.

"No good," he muttered. "No good for anything."

"We'll see. When we dig it out."

"With just our hands?"

"We have spades."

She ran to the hollow where they had found the survival pod and brought back the empty plastic halves. With one of them for a tool, she attacked the hard-crusted snow.

"Okay." Still doubtful, he went to work with the other half. "I don't know what else to do."

On Andoranda Five, no task was easy. The heavy gravity dragged at them. The atmosphere denied them breath enough. When the wind rose, the bitter dust stung their eyes and burned their throats and set them both to coughing. The murky days and savage nights flashed by too fast for their tiny hoard of food.

Red mud grimed their faces and stiffened the coveralls in which they worked and slept and lived. Under the mud, Buglet's face grew gaunt, her eyes hollowed and inflamed. Sometimes he heard her moan or cry out in her sleep and knew that she was dreaming again of that demoniac creature sent by the gods to stalk them down.

But they reached the pilot's door. Chopping with the splintered relics of their makeshift spades, they broke through stubborn ice and pried it open far enough to let them squirm into the

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cockpit. He lit the signal lantern to explore its frigid gloom.

"Less damage than I expected." She sank into the pilot's seat to get her breath. "Everything looks as if the crew just got out and walked away. Our problem now is to find out what went wrong."

Though neither had ever flown a skimmer, they had ridden in those the Polarians had brought to Redrock. Davey spent several Andorandan days working through the operations manual and maintenance records they found under the console. Buglet sat unwontedly silent most of the time, her eyes dark and distant—watching, so she said, for the demon. When he was ready at last to begin testing the equipment, she woke from her somber trace, suddenly cheerful.

"We're lucky again." Watching the dials, she smiled happily. "There's power left."

"Too little, I'm afraid." He stopped to scowl again at the unfamiliar instruments. "Too little for the indicated weight. I think the skimmer is overloaded—at least for Andorandan gravity. I think the cargo caused the wreck."

"If that's the problem, we must unload it."

The cargo had puzzled him, from his first glimpse of it. It was heavy equipment which must have been brought to level and pave the shuttle strip and build roads about the station. Somehow, it had all been burned to scrap metal, not worth moving anywhere. When the skimmer fell, it had all been thrown into a twisted mass against the forward bulkhead.

At first he saw no way to get the blackened tangle off the skimmer, but under Buglet's urging he found the undamaged boom and null-G tackle that must have been used to drag the burned machines aboard. The hazy days flickering by, they toiled again to clear away the layered ice and dust outside the cargo hatch, digging now with scraps of junk metal.

An Andorandan storm delayed them. A red dust-cloud, rolling out of the west, blinding when it struck, acrid and unbreathable. Howling gusts and roaring thunder. Clanging hail, that he though might smash the hull. Deep new drifts outside the hatches.

They sat through it in the cockpit, and Buglet dropped into a fitful sleep when the wind and hail subsided. Once she cried out so sharply that he thought she had been hurt. He caught her arm to wake her.

"It's no dream, Davey!" He felt her trembling. "I get a sense of something hunting us—something powerful and cruel, sent by the gods to kill us. It's not here yet—not even in this universe. But I feel it getting closer. Always closer. Somehow, it can follow our trail."

"Bug, couldn't you be wrong? You haven't been sleeping enough or eating enough. You're worn out with work and strain. People can imagine—"

"Don't kid me, Davey." She tried to laugh. "I know what's real—and I'm dreadfully afraid. I hope we can get to

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the other station before the demon catches up. The goddess should be landing there soon—"

"If she hasn't already come and gone."

"We've got to hope she hasn't." Buglet shuddered. "I think perhaps she could protect us."

The storm gone, they found most of their work undone. The cargo hatch was buried again, and they had to dig once more through heavy layers of ice and dust and mud. They found it damaged when they reached it, jammed and hard to open. When at last it was lifted, they rigged the cargo boom. One by one, they dragged the burned machines out of the hold and through the hatch and off the ramp.

"It still bewilders me." Davey freed the null-G tackle from the last mass of junk metal. "Unless the monks had lost their minds. This wreckage is good for nothing, and it was loaded in a way that made it sure to shift and tip the skimmer."

"No matter. We're ready to fly."

The hatches closed again, they sat at the controls. She monitored the console while he energized the gravitic inverters, gingerly at first, slowly pushing them to full lift. The skimmer refused to move.

"So it wasn't just the load," he muttered. "Something else is wrong."

"Perhaps we're frozen down. Try the thrusters."

He tried the thrusters. Something snapped and creaked. When he tried again, the skimmer shook. He rocked it. Ice outside cracked and rattled. The deck pitched. Suddenly they were in the air.

"We're on the way!" She clapped her hands. "We'll see our people soon."

"Not today," he warned her.

The strip and the snow-banked huts shrank and dimmed under yellow haze as they rose. When the Polarians had flown it, with the hull pressurized and the thrusters at full power, it might have climbed above the dust to cross the continent in half a short Andoranda day.

But now it was a limping wreck. The damaged hatch could not be fully sealed. The navigation gear had been designed for Earth, and the monks had installed nothing he could find to show distance and direction here. With only the map for a guide, they would have to keep beneath the dust. The old cell banks held power for lift, but with little left for the thrusters. When he tried them, the skimmer felt sluggish and slow.

"We can't take long." Buglet shivered. "We can't take long."

Sharing her dread, he pushed the thrusters to the limit of their faltering power. With the tattered map spread between them on the navigation table, they left Station One to follow the long curve of that enormous muddy river until it poured through a chain of dead volcanoes in red-foaming rapids and a mile-wide fall that thundered down into blood-colored mist. When the abrupt night caught them, they dived to land on a black lava plain.

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That night it was his turn to sleep, while Buglet watched. She looked small and forlorn when she woke him at dawn, her lean face bleak beneath the grime, her eyes too large, her pale lips quivering.

"It's here," she whispered. "Already in this universe."

With no delay for breakfast, because the last of the ration bricks was gone, they took off at once. In a vast basin beyond the fall, the river widened into an endless brown inland sea, scattered with islands of dirty ice. All day they traced its shore and came down on the mud-plain beside it when night fell again.

Next day the river led them through spectacular red-walled canyons into an immense desert of wind-carved orange dunes. There it disappeared. Ahead of them, all the way to the coastal range—perhaps a thousand miles, he guessed—the map was blank. Guessing direction by the shape of the dunes, they went on until darkness forced them down. He slept while Buglet watched. The night seemed too short, and he woke groggy and depressed.

"It hasn't caught up yet." She seemed alert and oddly cheerful. "We ought to get across the range today. Maybe all the way to Station Two."

Grinning weakly at her, amazed at her radiant vitality, he wanted to ask if she had learned to exist without food, drawing energy out of the multiverse the way the gods did. But the mere effort of speech had become a burden. He said nothing.

When the hazy sky grew bright enough to show the curves and slopes of the dunes, he lifted the skimmer. Beyond the sand desert, now with only the slope of the land for a compass, they kept heading for higher ground. Bare dark foothills beckoned them across a great plateau scattered with monumental buttes. Black lava fields lifted and vanished at last under a wilderness of snow where the glacier-bitten peaks towered into stormy clouds.

The cockpit chilled as they climbed. In the thinning air, they were breathing heavily. Red lightning began to flicker in the wall of the cloud ahead, and he turned uneasily to Buglet.

"I'm going to land. If night catches us in that storm, we could crash the skimmer all over again. By morning, the weather may be better—"

She wasn't listening. Hunched against the cold, she had twisted to stare blankly back the way they had come. With a shudder, she turned suddenly to face him.

"It's here," she whispered. "Trailing us from Station One. We can't stop."

Keeping to valleys and canyons, searching for a pass, they climbed into the storm. Lightning blazed around them. Savage winds tugged and hauled, tossed them into foggy voids, flung them toward ice-armored peaks.

"No!" He heard Buglet's stifled sob. "Please, no—"

A sharper chill numbed him, and he felt power drained from the thrusters. The skimmer dropped through swirling

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snow. Jagged granite loomed ahead. With inches to spare, he brought them through a narrow gap into wind and mist and fury.

"It has caught us." Hushed with dread, her voice was almost lost in a volley of hail. "It's riding on the hull. Sucking power out of the cells—I don't know how—trying to drag us down."

He fought it. With the thrusters dead, he dived for speed enough to gain control. They skimmed past sudden cliffs, dodged a volcanic cone, slid down a black-walled gorge.

"I think that gap was the pass." Feeling her bleak desperation, he tried to seem hopeful. "I think we've got the main range behind us. If we can live to find the station—"

The cockpit lights went out. The controls froze. Dead metal, the skimmer swirled down through dense fog. He heard her anguished gasp, felt her cold lips brush his cheek.

"We can't just die!" Her voice in the dark had a calm force that startled him. "We won't—"

The wind of their fall screamed around the skimmer. Dark rocks sprang at them out of the fog, grazed the hull. Torn metal shrieked. The skimmer spun. Flung against the seat restraints, he glimpsed a long snow-slope.

Something struck his head—

5.

It was dark and quiet and deadly cold. For a moment he didn't know anything else. Then all the tension and the terror of their flight came back, a jolting impact. The demon on the skimmer. Their crash across the cliffs into the snow. He reached for Buglet in the seat beside him, but his numb fingers found nothing at all.

"Bug—"

He tried to call her name, but no sound came. His breath was gone, and a great weight crushed his chest. He had to lie back, gasping. It took a long time to fill his lungs, and the air he inhaled seared them with cold.

"Bug—" Hoarsely, he tried again. "Bug?"

No answer came.

He tried to unlock the padded arms that held him in the seat, but his clumsy fingers couldn't find anything. What pinned him down was something heavy across his knees, which he couldn't see and couldn't move.

Listening, he heard a faint groan of bending metal and a dull crunch of yielding snow. Something shuddered under him, and the vise closed harder on his knees. Then there was only soundless, paralyzing cold.

He lay wondering about the nature of the demon. To have trailed them here across all the unimaginable discontinuities of the multiverse, it must be more powerful than Belthar himself. Even if they had been able to reach Zhondra Zhey at the second station, she couldn't have helped. Only a child goddess, she would have been no match for such an ultimate fiend.

Slow with cold, his mind came back to Buglet. Perhaps she was somewhere with him in the wreckage, unconscious

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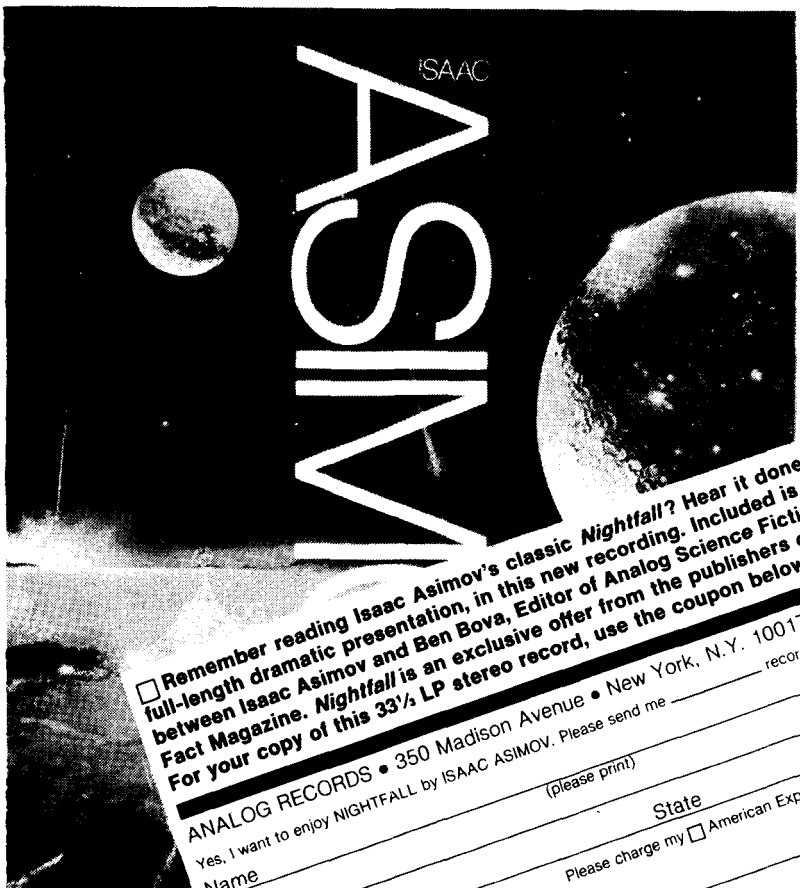
or dead. Perhaps she had been thrown outside, to die on rocks or snow. Perhaps the demon had turned unknown forces against her. It didn't matter. Nothing mattered, if Bug was dead.

Why was he still alive? To his dull brain, that was an oddly abstract riddle. Perhaps the demon was lurking still, outside the wreckage, watching him die. Perhaps it had already gone to stalk the premen at the station, leav-



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ing him for dead. He didn't know. Strangely, he didn't really care.

But it struck him as a great pity that the Fourth Creation had failed, a long thousand years after Eva Smithwick tried to repair the error that had left the gods without compassion enough to match their might. The waste of time and life and hope was shattering tragedy—but what hurt most was his grief for Bug.

When a muffled clatter aroused him, he knew that he had been deep in the anesthesia of cold. His knees were dead beneath that weight he couldn't see. He couldn't feel his feet, and his useless fingers ached. He tried to lift his head, straining to listen.

It came again: a scrape of metal, a creak of packing snow. Gray light struck from behind him, and a draft of colder air. He tried to turn, but his lifeless legs would not respond and his body was too heavy to move. He heard a far gale howling, saw swirling flakes of snow.

"Bug?"

He breathed her name and sank back again, with no actual hope.

"Davey, darling!" Her lilting voice seemed strangely clear and strong, melodiously caressing. "Let me help you."

She came into view out of the gloom, moving with such perfect ease and grace that for a moment he thought she must be a dream. The grimy coveralls gone, she was nude and white and smooth. Her fluid beauty dazed him.

Swift as a dream, she bent over him. Long and free, her black hair poured across his face. Its overwhelming odor took his breath—her too-sweet bridal scent, mixed with the clinging incense-reek of Belthar's altar, tainted with a sour hint of godsgrace.

Her bare arms slid under him, smooth as glass and cold as snow. She lifted him against her white breasts. Her avid lips writhed through the suffocating hair, crushed against his mouth, sucking out his breath. They were cold as ice.

"Bug—"

He couldn't speak. Convulsively, he tried to turn his head, to get his breath, to push her off. Horror paralyzed him. She—it—wasn't Bug!

"Call me Gleesh." The voice was hers, but cool and amused, laughing at him. "Your darling Bug is under the avalanche, buried under a million tons of ice."

Still chuckling, it changed. The heavy-scented hair was suddenly a snake, sleek-scaled and powerful, whipping around his neck, cruelly constricting. The breasts burned red, turned to the killing eyes of a muman fighter. The trim legs became monstrous, hard-armored limbs, raking at him with savage talons.

He was dying. Those merciless coils were crushing his throat. Breath gone, his lungs were agonized. The blazing eyes stung his body with their stabbing pathseeker beams. The talons ripped through his clothing, tore at his numb flesh.

But, before he died, he felt a flow of power. As if she were still with him in

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the cockpit, he heard the real Buglet whispering: *We need danger, Davey! To wake our latent talents.*

His stiffened fingers alive again, he caught the thick coils at his throat. They knotted against his grasp, quivering, pulling savagely tighter. Teeth set, he strained to tear them away.

"Thank you, darling!" It was laughing again as if with delight, speaking still with Buglet's breathless voice. "I hate an easy kill. The chase for you and your Bug has been grueling enough, but these lovely fights are worth it all."

The snake contracted again, crushing his own hands into his throat. The killer eyes struck with blazing bolts, deafening in the narrow cockpit. Their blue fire was blinding. A reek of burned fabric and seared flesh stung his nostrils, and his whole body jerked from the shocks, a puppet ruled by strings of pain.

Yet he didn't die.

If we need danger—Without speech, he tried to think at the actual Buglet, suddenly daring to hope that she was somehow still alive.—*here it is!*

New power nerved his hands, as if she were in fact still beside him, helping him open some unsuspected source of multiversal energy they both could share. He tore the crushing coil away from his throat, sucked air into his tortured lungs.

"Darling!" it breathed. "Do that again!"

Forcing those cruel loops farther away, he saw his own hands—and marveled at them. For they were glowing slightly in the gloom with a pale white light of their own, like the auras of the gods.

He closed them on the snake. The hard scales crackled and snapped under his luminous fingers. The muscular mass of it yielded. Hard tissue tore. Sudden red fire blazed and faded against the glow of his hands, and the coils were gone.

"Oh, Davey—"

With that gasp of joy, it changed again. He felt hard metal, smelled hot oil, heard a keen mechanical squeal. Bright steel blades spun against his chest, slashing through the coveralls.

But somehow they couldn't touch his glowing skin. He flung both arms around that shifting shape, squeezed. The metal buckled and fractured and changed again. It became a blob of clinging jelly that flowed and tried to freeze around him, became a cloud of nauseating gas that burned his eyes and choked his throat.

"Davey, I do love you!"

Still he squeezed.

Its happy laughter ceased. Suddenly invisible, impalpable, it tried to get away. He held it grimly, probing for its life with the faint glow of his expanding nimbus.

"Dav—"

It had slashed back at him with its own red fire, but that dimmed and winked out. His shining hands held only emptiness. Nothing was left in the cockpit with him except a thin strange stink, a little like the scent of a den of diamondbacks, more like the

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odor of a poison weed El Yaqui had showed him on the Redrock mesa long ago.

The demon was dead.

In the struggle, he had somehow freed his knees from the object that had fallen on them—he saw now that it had been a massive steel-cased gravitic inverter that had been thrown through the bulkhead when the skimmer crashed.

He climbed out of the cockpit through the passage the demon must have opened through piled snow and battered metal. It felt good to stand straight and fill his lungs with clean air. Though his coveralls had been ripped to shreds, he somehow no longer felt the cold.

Pausing on a snow mound, he turned his hands, squinting at them with puzzled awe. Here, even in the yellow-gray light that filtered through the Andorandan storm, that dim nimbus was no longer visible. But it had been real. His hidden powers had been awakened long enough to let him kill a creature more deadly than a god.

But even as he strove again to understand that genetic gift, his elation was already fading. He felt chastened, almost guilty. Terrified at first, he had come before the end to enjoy the risk and pain and desperate effort of that combat almost as much as the demon did. Somehow, he felt, they had been kin.

When he turned to look for Buglet, his concern for her swept that discontent away. The flattened ruin of the skimmer was almost covered with the snow that sloped steeply up and steeply down as far as he could see through the wind-whipped fog and snow.

She wasn't in the wreck—he felt somehow sure of that. Afraid the vast snow-slide had really buried her, he picked his way down the slope to look for her, slipping and stumbling, pausing again and again when cascading snow seemed about to start another avalanche.

The clouds thinned until at last he could see the barren valley at the foot of the slope, a vast trough of ice and snow and shattered stone, the tumbled stuff of the last slide forming a frozen wave far up the farther wall. If Buglet had been buried there—

He saw her then, a tiny yellow dot in her survival suit, creeping toward him down that snow-veiled wall. She waved, when she reached the bottom of it, and stopped to wait for him. She was sitting on a boulder when he came to her, damp from the snow and flushed with exertion, her lemon eyes luminous. The grime and terror of their long trek were gone, and her beauty stabbed him like a blade. He took her in his arms—and trembled from her cool kiss when he remembered the demon.

"It's dead, Davey." The whisper was her own, grave and true. "It was the only thing able to trail us, and I saw you kill it. I was watching—somehow watching—from where I was trapped under the snow."

"I felt you—" The shudder passed. She was warm and light and alive in his arms. The flakes of snow that

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starred her hair and chilled her face were only snow. That demoniac hunter was dead, and her lips felt warm again. "I felt you helping—I don't know how—"

"There's a lot you have to learn." Mischief flashed and vanished in her eyes. "I tried to help, and I felt you helping me. Don't you remember?"

Happy and relaxed, he didn't try to answer.

"The demon hit me first." She could see that he didn't remember. "The skimmer had been ripped open on the rocks we struck. The demon pulled me out and tried to kill me in the avalanche. It left me smothered under tons and tons of rock and ice. At first I thought I was going to die, but then you came to help me. Together, we made an aura for me, strong enough to shield me and lift me out."

Feeling no need to say much more, they went on together down the glacial valley until they reached the brink of another ice-fall. Freezing winds whipped over its lip, and they drew back in awe from the chasms beyond. Endless snow-slopes. Ice-carved gorges. Sheer black cliffs, dropping at last to the dark-red ocean.

"It's alive." Staring out across its boundless blood-colored immensity, he saw something black and far away that jumped and flashed and fell back into a dot of bright foam. "I remember reading about it in truman books. The Andoranda analog of chlorophyll is red." Shrinking from the wind, he shivered. "Live—but not our kind."

"But this is the south cape." She leaned to look far down at the ragged line of pink surf that traced the feet of those forbidding walls of naked stone. "Our only problem now is how to find our people."

"Problem enough," he muttered. "I can't see any way down to the beach. Even if we got there, we wouldn't know which way to go—"

"That way, maybe."

She had turned with a gasp of surprise to point at a spur of rock behind them, and now he saw a trail winding around it toward a high gleam of metal. They climbed the trail to a flat rock shelf—a basalt bench that had been leveled for a landing pad. At the end of it, a spidery tower rose above a small metal dome. They pushed into the dome, through an unlocked door.

"An observatory." He nodded at the narrow slit toward the sky. "El Yaqui showed the monks at Redrock the ruin of one on Creation Mesa—to prove to them that the premen knew astronomy long ago." From the doorway, he scanned that far line of surf. "If the Polarians built this one, the station should be close."

The flimsy-seeing tower held a beacon light, its power cells still alive. Before the sudden dusk fell, they had found how to turn it on. They slept that night on the floor of the empty dome, with no evil dreams. A skimmer woke them, screaming down to land—a time-worn twin of the one they had repaired. Running to meet it, they froze when they saw the grotesque being on the ramp. A tiny bundle of

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black-and-yellow fur, bounding on two enormous arms.

"Pipkin!" Buglet's greeting was a cry of delight. "How did you get here?"

"With Zhondra Zhey." The godlet hopped to a halt, cocking back the fat pink baby-head to grin at them with one green eye. "Flooded out of my home, with nowhere else to go, I got her to sneak me aboard her ship—not expecting to meet the two of you again."

"Is she still here?"

"About to leave." His voice was a keen mosquito whine. "If you want to come, you're just in time."

"Come where?"

"To a kinder world than this one." Standing on one gold-furred hand, he gestured with the other as if to erase the ice-crowned black cliffs and the scarlet sea. "One where Belthar and his arrogant kin will never trouble us."

"But—is there such a world?" Davey frowned at him. "One of Belthar's creatures has already tracked us here. He'll be sending others—"

"They'll never find us," Pipkin whistled. "It's a place I discovered myself, but only by an accident I'm sure they won't repeat. On the way here, Zhondra was giving me a lesson in transvolutionary navigation. By what should have been a fatal mischance, I skipped the ship through a forbidden discontinuity, into a universe that had been charted as antimatter—"

"Oh—" Buglet gasped.

"But it wasn't." Pipkin gave her his impish grin. "We didn't die. It turned out the charts were wrong. Before we got out, Zhondra had located a Sol-type sun with a family of friendly-seeming planets. She's reloading the premen now, with all the supplies she can carry, and we'll soon be on our way. I'm certain she'll make room for you—if you can explain how you got here."

"We somehow jumped—teleported, maybe I should say—to Station One. And came on from there in a skimmer the monks had abandoned by the strip." Shifting uncomfortably before Pipkin's doubtful one-eyed stare, he turned to gesture at the dome and the tower. "We were pretty lucky, stumbling on this installation."

"If you call it luck." Pipkin blinked at the beacon, still flashing green-and-blue. "But how did it get here?"

"Didn't the Polarians—" His breath caught. "It was an observatory. Maybe a weather station, too. The equipment is gone."

"Don't you know?" Pipkin shook his hairless head, with a grimace of sardonic disbelief. "The preman pilots have been flying along this coast, looking for a likelier site for the colony—which they never found. They swear they passed this spot a few days ago and saw nothing here. I've seen the records and charts the Polarians left at the station. They don't mention any observatory—and they didn't need one, because they never saw the sky."

"Then why—why did you come?"

"Your beacon." Pipkin nodded at it.

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"Blazing all night it was."

Davey saw Buglet staring strangely at him.

"Something else needs explaining." Pipkin hopped toward him, green eye shrewdly squinting. "The skimmer you found and flew. The Polarian records do mention that. They say it crashed and burned, with the cargo and the crew aboard. Nothing could be salvaged."

"Burned?" Blankly, Davey echoed the word. "It was loaded with burned machines. But the skimmer itself?"

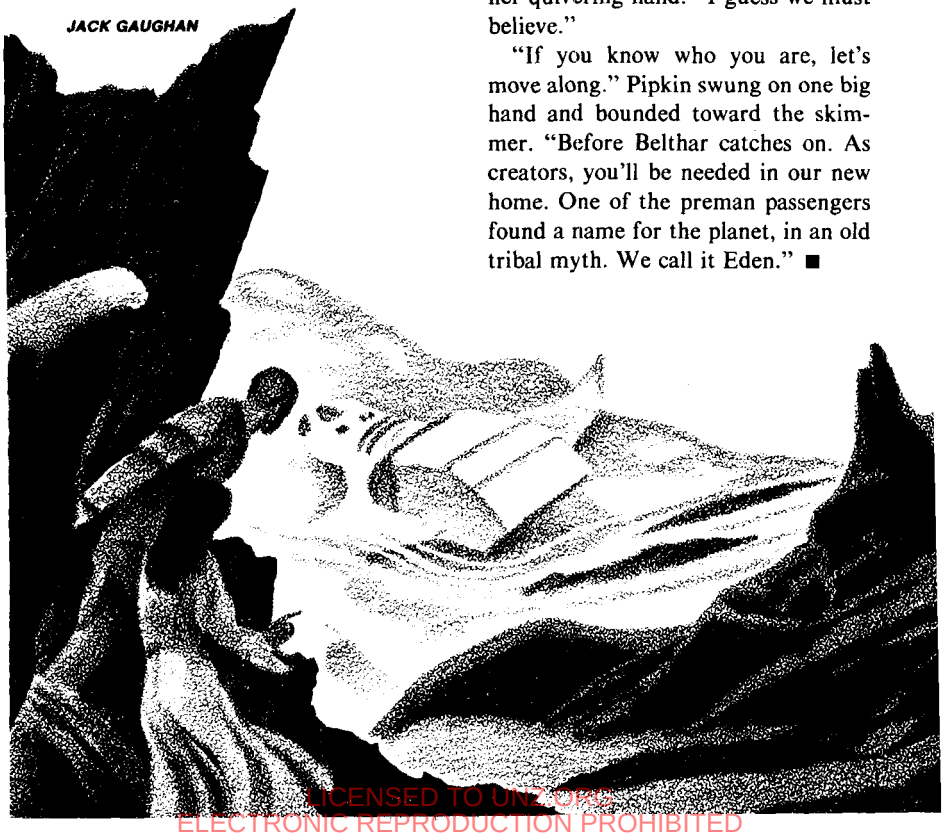
"That survival pod!" Buglet bent to stare at the tiny god, her voice hushed with awe. "Lying exactly where we had to find it. With the suits and stove and food we had to have, to keep us alive." She drew a long uneven breath. "Is it—is it true?"

"True." Pipkin nodded, grinning at her amazement, and peered again at Davey. "You have become creators. Gaining powers no god has ever owned—powers so awesome that you had to hide them from yourselves. Creating the devices to save your lives and bring you safely here, you felt forced to disguise them as lucky accidents."

"Davey—" Her yellow eyes shone. "Can you believe?"

"I guess—" He reached to grasp her quivering hand. "I guess we must believe."

"If you know who you are, let's move along." Pipkin swung on one big hand and bounded toward the skimmer. "Before Belthar catches on. As creators, you'll be needed in our new home. One of the preman passengers found a name for the planet, in an old tribal myth. We call it Eden." ■



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William Weisel pronounced his name why-*zell*, but many of the unfortunates for whom he had done remodeling and construction pronounced it *weasel*.

He had designed and built a new guest bathroom for Fred Tolliver, a man in his early sixties who had retired from the active life of a studio musician with the foolish belief that his fifteen thousand dollar-per-year annuity would sustain him in comfort. Weisel had snubbed the original specs on the job, had substituted inferior materials for those required by the codes, had used cheap Japanese pipe instead of galvanized or stressed plastic, had eschewed lath and plaster for wallboard that left lumpy seams, had skirted union wages by ferrying in green card workers from Tijuana every morning by dawn light, had—in short—done a spectacularly crummy job on Fred Tolliver's guest bathroom. That was the first mistake.

And for all of this ghastly workmanship, Weisel had overcharged Fred Tolliver by nine thousand dollars. That was the second mistake.

There have been many attempts to build a machine that amplifies and focuses psionic energy. But the best psionic device is still the human brain.

Fred Tolliver called William Weisel. His tone was soft and almost apologetic. Fred Tolliver was a gentle man, not given to fits of pique or demonstrations of anger. He asked Weisel politely to return and set matters to rights. William Weisel laughed at Fred Tolliver and told him that he had lived up to the letter of the original contract, that he would do nothing. That was the third mistake.

Putatively, what Weisel said was true. Building inspectors had been greased and the job had been signed off: legal according to the building codes. Legally, William Weisel was in the clear; no suit could be brought. Ethically it was a different matter. But even threats of revocation of license could not touch him.

Nonetheless, Fred Tolliver had a rotten guest bathroom, filled with leaks and seamed walls that were already cracking and bubbles in the linoleum from what was certainly a break in the hot water line and pipes that clanked when the faucets were turned on, if they could *be* turned on.

Fred Tolliver asked for repairs more than once.

After a while, William Weisel's wife, Belle, who often acted as his secretary, to save a few bucks when they didn't want to hire a Kelly Girl, would not put through the calls.

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Fred Tolliver told her, softly and politely, "Please convey to Mr. Weisel—" and he pronounced it why-*zell*, "—my feelings of annoyance. Please advise him that I won't stand for it. This is an awful thing he's done to me. It's not fair, it's not right."

She was chewing gum. She examined her nails. She had heard this all before: married to Weisel for eleven years: all of this, many times. "Lissen, Mistuh Tollivah, whaddaya want *me* to do about it, *I* can't do nothing about it, y'know. I only work here. I c'n tell 'im, that's *all* I c'n do, is tell 'im you called again."

"But you're his wife! You can see how he's robbed me!"

"Lissen, Mistuh Tollivuh, I don't haveta lissen to this!"

It was the cavalier tone, the utterly uncaring tone: impertinent, rude, dismissing him as if he were a crank, a weirdo, as if he weren't asking only for what was due him. It was like a goad to an already maddened bull.

"This isn't fair!"

"I'll tell 'im, I'll tell 'im. Jeezus, I'm hanging up now."

"I'll get even! I will! There has to be justice—"

She dropped the receiver into its rest heavily, cracking her gum with annoyance, looking ceilingward like one massively put-upon. She didn't even bother to convey the message to her husband.

And that was the biggest mistake of all.

The electrons dance. The emotions sing. Four billion, resonating like insects. The hive mind of the masses. The emotional gestalt. The charge builds and builds, surging down the line seeking a focus. A weakest link through which to discharge itself. Why this focus and not that? Chance, proximity, the tiniest fracture for leakage. You, I, him, her. Everyman, Anyman; the crap shoot selection is whatever man or woman born of man and woman whose rage at *that* moment is *that* potent.

Everyman: Fred Tolliver. Unknowing confluence.

He pulled up at the pump that dispensed supreme, and let the Rolls idle for a moment before shutting it off. When the attendant leaned in at the window, Weisel smiled around his pipe and said, "Morning, Gene. Fill it up with extra."

"Sorry, Mr. Weisel," Gene said, looking a little sad, "but I can't sell you any gas."

"Why the hell not? You out?"

"No, sir; just got our tanks topped off last night. Still can't sell you any."

"*Why the hell not*?!"

"Fred Tolliver doesn't want me to."

Weisel stared for a long moment. He couldn't have heard correctly. He'd been gassing up at this station for eleven years. He didn't even know

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they *knew* that creep Tolliver. "Don't be an asshole, Gene. Fill the damned tank!"

"I'm sorry, sir. No gas for you."

"What the hell is Tolliver to you? A relative or something?"

"No, sir. I never met him. Wouldn't know him if he drove in right now."

"Then what . . . what the hell . . . I—I—"

But nothing he could say would get Gene to pump one liter of gas into the Rolls.

Nor would the attendants at the next *six* stations down the avenue. When the Rolls ran out, a mile from his office, Weisel *almost* had time to pull to the curb. Not quite. He ran dry in the middle of Ventura Boulevard and tried to turn toward the curb, but though traffic had been light around him just a moment before, somehow it was now packing itself bumper-to-bumper. He turned his head wildly this way and that, dumbfounded at how many cars had suddenly pulled onto the boulevard around him. He could not get out of the crunch. It wouldn't have mattered. Improbably, for this non-business area, for the first time in his memory, there were *no* empty parking spaces at the curb.

Cursing foully, he put it in neutral, rolled down the window so he could hold the steering wheel from outside, and got out of the silent Rolls. He slammed the door, cursing Fred Tolliver's every breath, and stepped away from the car. He heard the hideous rending of irreplaceable fabric. His five hundred dollar cashmere suit jacket had been caught in the jamb.

A large piece of lovely fabric, soft as a doe's eye, wondrously ecru-closer-to-beige-than-fawn-colored, tailor-made for him in Paris, his most favorite jacket hung like slaughtered meat from the door. He whimpered; an involuntary sob of pain.

Then: "What the hell is going *on*!" he snarled, loud enough for pedestrians to hear. It was not a question, it was an imprecation. There was no answer; none was required; but there was the sound of thunder far off across the San Fernando Valley. Los Angeles was in the grip of a two-year drought, but there was a menacing buildup of soot-gray clouds over the San Bernardinos.

He reached in through the window, tried to turn the wheel toward the curb, but with the engine off the power steering prevented easy movement. But he strained and strained . . . and something went snap! in his groin. Incredible pain shot down both legs and he bent double, clutching himself. Flashbulbs went off behind his eyes. He stumbled around in small circles, holding himself awkwardly. Many groans. Much anguish. He leaned against the Rolls, and the pain began to subside; but he had broken something down there. After a few minutes he was able to stand semi-erect. His shirt was drenched with sweat. His deodorant was wearing off. Cars were swerving around the Rolls, honking incessantly, drivers swearing at him. He had to get the Rolls out of the middle of the street.

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Still clutching his crotch with one hand, jacket hanging from him in tatters, beginning to smell very bad, William Weisel put his shoulder to the car, grabbed the steering wheel and strained once again; the wheel went around slowly. He readjusted himself, excruciating pain pulsing through his pelvis, put his shoulder against the window post and tried to push the behemoth. He thought of compacts and tiny sports cars. The Rolls moved a fraction of an inch, then slid back.

Sweat trickled into his eyes, making them sting. He huffed and lunged and applied as much pressure as the pain would permit. The car would not move.

He gave up. He needed help. *Help!*

Standing in the street behind the car, clutching his groin, jacket flapping around him, smelling like something ready for disposal, he signaled wildly for assistance with his free hand. But no one would stop. Thunder rolled around the Valley, and Weisel saw what looked like a pitchfork of lightning off across the flats where Van Nuys, Panorama City, and North Hollywood lay gasping for water.

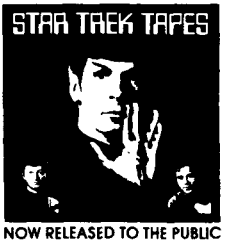
Cars thundered down on him and swerved at the very last moment, like matadors performing a complicated *veronica*. Several cars seemed to speed up, in fact, as they approached him, and he had the crazy impression the drivers were hunched over the wheels, lips skinned back from clenched teeth, like rabid wild things intent on killing him. Several nearly sideswiped him. He barely managed to hobble out of the way. One Datsun came so close that its side-view mirror ripped a nasty, raw gash down the entire right side of the Rolls. He cursed and gesticulated and pleaded. No one would stop. In fact, one fat woman leaned out of her window as her husband zoomed past, and she yelled something nasty. He caught only the word "Tolliver!"

Finally, he just left it there, with the hood up like the mouth of a hungry bird.

He walked the mile to his office, thinking he would call the Automobile Club to come and tow it to a station where it could be filled. He didn't have the time or the patience to walk to a gas station, get a can of fuel, and return to fill the tank. During the mile-long walk he even had time to

FIRST TIME EVER!

STAR TREK TAPES



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wonder if he would be *able* to buy a can of gasoline.

Tolliver! God *damn* that old man!

There was no one in the office.

It took him a while to discover that fact, because he couldn't get an elevator in his building. He stood in front of one after another of the doors, waiting for a cage to come down, but they all seemed determined to stop at the second floor. Only when other passengers waited, did an elevator arrive, and then he was always in front of the wrong one. He would dash to the open door, just as the others entered, but before he could get his hand into the opening to stop the retarder bar from slamming against the frame, the door would seem to slide faster, as if it possessed a malevolent intelligence. It went on that way for ten minutes, till it became obvious to him that something was terribly, hideously, inexplicably wrong.

So he took the stairs.

(On the stairs he somehow slipped and skinned his right knee as one of the steps caught his heel and tore it off his right shoe.)

Limping like a cripple, the tatters of his jacket flapping around him, clutching his groin, blood seeping through his pants to stain, he reached the eleventh floor and tried to open the door. It was, of course, for the first time in the thirty-five-year history of the building, locked.

He waited fifteen minutes and the door suddenly opened as a secretary, carrying some papers up one flight to the Xerox center, came boiling through. He barely managed to catch the door on its pneumatic closer. He stumbled frantically onto the eleventh floor and, like a man emerging gratefully from a vast desert to find an oasis, he fled down the corridor to the offices of the Weisel Construction Corporation.

There was no one in the office.

It was not locked. Was, in fact, wholly unattended and wide open to thieves, if such had chosen that office for plundering. The receptionist was not there, the estimators were not there, not even Belle, his wife, who served as secretary when he didn't want to hire a Kelly Girl, was there.

However, she had left him a note:

I'm leaving you. By the time you read this I will have already been to the bank and emptied the joint account. Don't try to find me. Goodbye.

Weisel sat down. He had the beginnings of what he was certain was a migraine, though he had never had a migraine in his life. He didn't know whether, in the vernacular of the United States Army, to shit or go blind.

He was not a stupid man. He had been given more than sufficient evidence that something malevolent and purely anti-Weisel was floating across the land. It was out to get him . . . had, in fact, *already* gotten him . . . had, in fact, made a well-ordered and extremely comfortable life turn into a nasty, untidy, redolent pile of doggie-doo.

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analog stars win nebulae

Two Analog stories earned their authors Nebula Awards at the annual Science Fiction Writers of America awards banquet in San Francisco, 29 April.

"Stardance," By Spider and Jeanne Robinson, was honored as the best novella.
"The Screwfly Solution," by Raccoona Sheldon, was voted the best novelette.

Other Nebula Awards went to:
GATEWAY, by Frederik Pohl, best novel.
"Jeffty Is Five," by Harlan Ellison, best short story.

Seth W. Rose

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And it was named *Tolliver.*

Fred Tolliver . . .! How the hell . . .? Whom does he know that could . . .? How did he . . .?

None of the questions reached a conclusion. He could not even formulate them. Clearly, this was insanity. No one he knew, not Gene at the gas station, not the people in the cars, not Belle, not his staff, not the *car door* or the building's *elevators* even knew who Tolliver was! Well, Belle knew, but what the hell did she have to do with *him*?

Okay, so it *wasn't* going so good with Belle. So they *hadn't* really reconciled that innocent little thing he'd had with the lab technician at Mt. Sinai. So what? That was no reason for her to ditch a good thing. *Damn that Tolliver!*

He slammed his hand onto the desk, missed slightly, caught the edge and drove a thick splinter of wood into the fat of his palm, at the same time scattering the small stack of telegrams across his lap and the floor.

Wincing with pain, he sucked at the splinter till it came out. He used one of the telegram envelopes to blot the blood from his hand.

Telegrams?

He opened the first one. The Bank of America, Beverly Hills branch 213, was pleased to advise him they were calling due his loans. All five of them. He opened the second one. His broker, Shearson Hayden Stone, Inc., was overjoyed to let him know that all sixteen of the stocks in which he had speculated heavily, on margin, of course, had virtually plummeted off the big board and he had to come up with seventy-seven thousand dollars by noon today or his portfolio was wiped out. It was a quarter to eleven by the wall clock. (Or had it, inexplicable, stopped?) He opened the third one. He had failed his est class and Werner Erhard himself had sent the telegram, adding in what Weisel took to be an unnecessarily gloating tone, that Weisel had "no human potential worth expanding." He opened the fourth one. His Wassermann had come back from Mt. Sinai. It was positive. He opened the fifth one. The Internal Revenue Service was ecstatic at being able to let him know they were planning to audit his returns for the past five years, and were seeking a loophole in the tax laws that permitted them to go back further, possibly to the start of the Bronze Age.

There were others, five or six more. He didn't bother opening them. He didn't want to learn who had died, or that the state of Israel had discovered Weisel was, in actuality, Bruno "The Butcher" Krutzmeier, a former prison guard at Mauthausen, personally responsible for the deaths of three thousand Gypsies, Trade Unionists, Jews, Bolsheviks, and Weimar democrats, or that the U.S. Coast and Geodetic Survey Department was gleefully taking this opportunity to advise him that the precise spot over which he sat was expected to collapse into the magma at the center of the Earth and by the way we've canceled your life insurance.

He let them lie.

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The clock on the wall had, to be sure, stopped dead.

In fact, the electricity had been turned off.

The phone did not ring. He picked it up. Of course. It—like its friend the clock—was stone dead.

Tolliver! Tolliver! How was he *doing* all this?

Such things simply *do not* happen in an ordered universe of draglines and scoop-shovels and reinforced concrete.

He sat and thought dark, murderous thoughts about that old sonofabitch, Fred Tolliver.

A 747 boomed sonically overhead and the big heavy-plate window of his eleventh floor office cracked, splintered, and fell in around his feet.

Unknowing confluence of resonating emotions, Fred Tolliver sat in his house, head in hands, miserable beyond belief, aware only of pain and anger. His cello lay on its back on the floor beside him. He had tried playing a little today, but all he could think of was that terrible man Weisel, and the terrible bathroom that was filling with water, and the terrible stomach pains his feelings of hatred were giving him.

Electrons resonate. So do emotions.

Speak of "damned places" and one speaks of locations where powerful emotional forces have been penned up. One cannot doubt, if one has ever been inside a prison where the massed feelings of hatred, deprivation, claustrophobia and brutalization have seeped into the very stones. One can feel it. Emotions resonate: at a political rally, a football game, an encounter group, a rock concert, a lynching.

There are four billion people in the world. A world that has grown so complex and uncaring with systems and brutalization of individuals because of the inertia produced by those systems' perpetuation of self, that merely to live is to be assaulted daily by circumstances. Electrons dance. The emotions sing. Four billion, resonating like insects. The charge is built up; the surface tension is reached; the limit of elasticity is passed; the charge seeks release; the focus is sought: the weakest link, the fault line, the most frangible element, AnyTolliver, EveryTolliver.

Like the discharge of a lightning bolt, the greater the charge on the Tolliver, the greater its tendency to escape. The force of the four billion driving the electrons in their mad dance away from the region of highest excess toward the region of greatest deficiency. Pain as electromotive force. Frustration as electric potential. The electrons jump the insulating gap of love and friendship and kindness and humane behavior and the power is unleashed.

Like the discharge of the lightning bolt, the power seeks and finds its focus, leaps the gap, and the bolt of energy is unleashed.

Does the lightning rod know it is draining off the dangerous electrical charge? Is there sentience in a Leyden

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jar? Does not the voltaic pile continue to sleep while current is drawn off? Does the focus know it has unleashed the anger and frustration of the four billion?

Fred Tolliver sat in misery, the cello forgotten, the pain of having been cheated, of being impotent against the injustice, eating at his stomach. His silent scream: at that moment the most dominant in the entire universe. Chance. It could have been anyone; or perhaps, as Chesterton said, "Coincidences are a spiritual sort of puns."

His phone rang. He did not move to pick up the receiver. It rang again. He did not move. His stomach burned and roiled. There was a scorched-earth desperation in him. Nine *thousand* dollars overcharge. Thirty-seven hundred dollars by the original contract. Twelve thousand seven hundred dollars. He had had to take a second mortgage on the house. Five more months than the estimated two Weisel had said it would take to complete the job. Seven months of filth and plaster dust and inept workmen tramping through his little house with mud and dirt and dropping cigarette butts on his floor.

I'm sixty-two years old, he thought, frantically. *My God, I'm an old man. A moment ago I was just middle-aged, and now I'm an old man . . . I never* felt *old before. It's good Betsy never lived to see me like this; she would cry. But this thing with the bathroom is a* terrible *thing, an awful thing, it's made me an old man, poor in financial straits; and I don't know how to save myself. He's ruined my life . . . He's killed me . . . I'll never be able to get even, to put away a little . . . if the thing with the knees gets any worse, there could be big doctor bills, specialists maybe . . . the Blue Cross would never cover it . . . what am I going to do, please God help me . . . what am I going to do?*

He was an old man, retired and very tired, who had thought he could make it through. He had figured it out so he could just barely slide through. But the pains in the backs of his knees had begun three years before, and though it had not flared up in sixteen months, he remembered how he would simply fall down, suddenly, ludicrously, fall down: the legs prickling with pins and needles as though he had sat cross-legged for a long time. He was afraid to think about the pains too much. They might come back if he thought about them too much.

But he didn't really believe that thinking about things could make them happen. Thinking didn't make things change in the real world. Fred Tolliver did not know about the dance of the emotions, the resonance of the electrons. He did not know about a sixty-two-year-old lightning rod that leaked off the terror and frustration of four billion people, all crying out silently just as Fred Tolliver cried out. For help that never came.

The phone continued to ring. He did not think about the pain he had felt in the backs of his knees, as recently as sixteen months ago. He did

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not think about it, because he did not want it to return. It was only a low-level throbbing now, and he wanted it to stay that way. He didn't want to feel pins and needles. He *wanted* his money back. He *wanted* the sound of gurgling under the floor of the guest bathroom to stop. *He wanted William Weisel to make good.*

He answered the phone. It rang once too often for him to ignore it.

"Hello?"

"Mr. Tolliver? Is that you?"

"Yes, this is Fred Tolliver. Who's calling?"

"Evelyn Hand. I haven't heard from you about my violin, and I'm going to need it late next week . . ."

He had forgotten. In all the anguish with Weisel, he had forgotten Evelyn Hand, and her damaged violin. And she had paid him already.

"Oh, my gosh, Miss Hand, I'm awfully sorry! I've just had the most awful business going on these last months, a man built me a guest bathroom, and he overcharged me nine thousand dollars, and it's all broken and . . ."

He stopped. This was unbecoming. He coughed with embarrassment, giving himself a moment to gather his composure. "I'm just as terribly sorry and ashamed as I can be, Miss Hand. I haven't had a chance to get to the repairs. But I know you need it a week from today . . ."

"A week from *yesterday,* Mr. Tolliver. Thursday, not Friday."

"Oh. Yes, of course. Thursday." She was a nice woman, really. Very slim, delicate fingers and a gentle, warm voice. He had thought perhaps they might go to the Smorgasbord for a meal, and they might get to know each other. He wanted companionship. It was so necessary; now, particularly, it was so necessary. But the memory of Betsy was always there, singing softly within him; and he had said nothing to Evelyn Hand.

"Are you there, Mr. Tolliver?"

"Uh, yes, Yes, of course. Please forgive me. I'm so wrought-up these days. I'll get to it right away. Please don't you worry about it."

"Well, I *am* rather concerned." She hesitated, as though reluctant to speak. She drew a deep breath and plunged on: "I did pay you in advance for the repairs, because you said you needed the money for bills, and . . ."

He didn't take offense. He understood perfectly. She had said something that otherwise she would have considered *déplacé,* but she was distraught and wanted to make the point as firmly as she could without being overly offensive.

"I'll get to it today, Miss Hand; I promise."

It would take time. It was a good instrument, a fine, old Gagliano. He knew he could finish the repairs in time if he kept at it without distraction.

Her tone softened. "Thank you, Mr. Tolliver. I'm sorry to have bothered you, but . . . you understand."

"Of course. Don't give it a thought. I'll call as soon as it's ready. I'll give it special attention, I promise."

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"You're very kind."

He was incapable of crying. He had cried himself out. He knew, at last, that there was no way to save himself. On the third day, he had tried to get to Tolliver, to beg him to stop; to tell him he would repair the bathroom; to tell him he would build him a new house, a mansion, a palace, *anything*! Just stop this terror! *Please!*

But *he* had been stopped. He could not *get* to Tolliver. The first time he had set his mind to seeing the old man, he had been arrested by a California Highway Patrol officer who had him on his hot sheet for having left the Rolls in the middle of Ventura Boulevard. Weisel had managed to escape on foot, somehow, miraculously.

The second time he had been attacked by a Doberman while skulking through back yards. He had lost his left pant leg below the knee.

The third time he had actually gotten as far as the street on which Tolliver's house sat, but a seven-car pileup had almost crushed him beneath tons of thundering metal, and he had fled, fearing an aircraft carrier might drop from the sky to bury him.

He knew now that he could not even make amends, that it was inertial, and that he was doomed.

He lay back, waiting for the finish. But it was not to be that easy. The song of the four billion is an unending symphony of incredible complexity. As he lay there, a derelict stumbled into the alley, saw him, and pulled the straight razor from his jacket pocket. He was almost upon him when William Weisel opened his eyes. He saw the rusty blade coming for his throat, had a moment of absolute mind-numbing horror wash over him, spasmed into shock, and did not hear the sound of the cop's service revolver as the derelict—who had serviced over a dozen other such bums as Weisel in this same manner—was blown in half.

He woke in the drunk tank, looked around, saw the company to which he had been condemned, knew that if he lived it would be through years of horror, and began tearing off strips of rags from what remained of his clothing.

When the attendant came to turn the men out into the exercise area, he found William Weisel hanging from the bars of the door, eyes bulging, tongue protruding like a charred leaf from his mouth. What he could not reconcile was that no one in the cell had even shouted, nor raised a hand to stop Weisel. That, and the look of voiceless anguish on the dead man's face, as though he had glimpsed, just at the instant of death, a view of an *eternity* of voiceless anguish.

The focus could direct the beam, but it could not heal itself. At the very moment that Weisel died, Fred Tolliver—still unaware of what he had done—sat in his home, realizing finally that the contractor had done him in. He could never repay the note, would perhaps have to get work again in some studio, and probably would be

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unable to do it with sufficient regularity to save the house. His twilight years would be spent in some dingy apartment. The modest final hope of his life had been denied him: he would not be able to just simply get by in peace. It was a terrible lonely thing to contemplate.

The phone rang.

He picked it up wearily. "Yes?"

There was a moment of silence, then the voice of Miss Evelyn Hand came across the line, icily. "Mr. Tolliver, this is Evelyn Hand. I waited all day yesterday. I was unable to participate in the recital. Please have my violin waiting for me, repaired or not."

He was too stunned, too depressed, even to be polite. "Okay."

"I want you to know you have caused me great pain, Mr. Tolliver. You are a very unreliable and evil man. I want you to know I'm going to take steps to rectify this matter. You have taken money from me under false pretenses, you have ruined a great opportunity I had, and you have caused me unnecessary anguish. You will have to pay for your irresponsibility; there must be justice. I will make certain you pay for what you've done!"

"Yes. Yes, of course," he said, dimly, faintly.

He hung up the receiver and sat there.

The emotions sang, the electrons danced, the focus shifted, and the symphony of frustration went on.

Fred Tolliver's cello lay unattended at his feet. He would never get through, just barely slide through. He felt the excruciating pain of pins and needles in his legs.

"No snowflake in an avalanche ever feels responsible." S.J. LEC ■

IN TIMES TO COME

No story we've published in recent years has stirred readers as much as Spider and Jeanne Robinson's "Stardance" did, in our March 1977 issue. The mail was overwhelmingly enthusiastic. The Science Fiction Writers of America gave the story their treasured Nebula Award. And the story is on the final ballot for a Hugo Award.

But the story isn't finished! Next month, STARDANCE II begins. This three-part serial takes up where the first segment of the story ended, and carries the tale out to its logical—yet excitingly surprising—climax, out near the rings of Saturn. Richard Powers has painted a striking cover illustration for the novel.

Also in our September issue will be Joe Goodavage's "Skyquakes, Earthlights, and E.M. Fields," which relates some puzzling celestial phenomena to very real—and dangerous—terrestrial events.

Plus a new novelette by Dean Ing, more stories and features.

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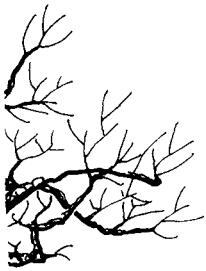

COUSINS

There is only one intelligent species on Earth today. Why?

BERNARD DEITCHMAN

I

The rain stopped.

Stonebreaker squatted in the long grass and looked at the sky. The clouds were breaking and lifting. Daylight grew stronger, and Stonebreaker had to shield his eyes while they adjusted to it. Were the rains over? He looked toward the distant outcrop of rock, at the pinnacle that rose above the rest of the outcrop. He looked at the low trees, the only things other than the outcrop that broke the even horizon of the plains. There was not much cover for him, if the rain did not come back. But if the season was about to turn he might not need stone from the outcrop. He might be able to wait out the flood in the South Lake that covered his usual supply of stone. He might be able to turn back to the forest.

But if the season had not turned? He pulled the animal skin pouches on his shoulder forward and looked in them. They held nothing but rock dust and splinters. He could not trust the weather to give him stone, but he had hoped it would give him protection, that it would hide him from the Longheads while he ran to the outcrop. Now he felt as if his best weapon had been torn from him.

He looked back at the forest, and whined. He threw the pouches back across his shoulder, and stood up and searched the plains for movement. There was none. Encouraged, he ran for the outcrop, his spear ready. The pouches and his other spear bounced on his back.

He came to a narrow stream. Unable to swim, he waded across carefully, probing the bed of the stream in front of him with the butt of his spear. At the other side he found a plains cat

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asleep in the grass beyond the bank.

The cat was larger than the tree cats he knew, and its markings were of a different pattern and a duller color, but otherwise it was much like them. Stonebreaker began to sneak off through the grass, and the cat woke. It stood up, its legs stiff, and backed away, hissing as it went.

Stonebreaker waited to see if the cat would stalk him. It did not, and he went on, happy—and surprised—that the cat feared him so.

He was soon running among scattered boulders and short piles of rock that were deeply weathered and streaked with moss. He would find nothing he could use here. He ran on to the pinnacle, where there would be fresh rock falls, and a better choice of stone.

He prowled all sides of the pinnacle, searching for danger. On its north side he found a thing that frightened him. A wide, twisting path led up the north face. He went up the path a few steps, but, after the long rain, there was no mark or scent to tell him what animal had made it. He looked out across the plains. Even a short way up the path, his view of the plains was much better than it had been on the ground. He saw a herd of animals he had not been able to see from below, distant specks too small to name. The sight of so much meat made his stomach rumble. The tribe could not find that much meat in the forest in many seasons of hunting. Even if there was no scent, he knew now what animal had made the path he stood on. The pinnacle was made for hunters, for Longheads.

He wanted to run. He choked back a whine and looked up the path. He saw no cave or overhang that would give hunters shelter from the rain. The Longheads must live here only in the dry season, he thought. He hoped so.

He began to search for stone, and gradually worked his way up the path. The best, hardest stone was still buried in the pinnacle itself. He could make a crude tool and chip off what he wanted, but he would make much noise doing it. Longheads anywhere near would know that a man was on the plains, and come to kill him. He forgot about making a tool, and looked among the fallen rocks for chunks not too weathered to be reliable, or pieces only partly weathered from which he could save something.

Once he saw a plains cat going south past the pinnacle, and he wondered if it was the cat he had met at the stream. He had just lost sight of the cat when he smelled a strange scent. He ran down the path and crouched in the grass, but no animal came after the scent. The scent was quickly gone from the wind, and after a walk around the pinnacle showed nothing dangerous near, he went back up the path to work. He tested the damp, shifting wind often after that, ready to run again. He would not have gone back at all, except that only one pouch was filled with stone, and that was not enough. And the plains were new to Stonebreaker. The animals here would not smell like the animals in the forest. The strange scent he had

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smelled could have been from an animal the cat had been stalking. It did not have to be the scent of a Longhead.

His other pouch was nearly filled when the scent came again. He searched the plains, and saw no animals close. He stared up the path, which went on much higher than he had climbed. He saw nothing there.

He decided he had enough stone. He started down the path carefully, as the weight of the stone in his pouches affected his balance. The scent grew stronger, and then he heard something move above him. He did not look back. He dropped his pouches and his other spear, and ran. He heard something leaping after him.

He hit the ground and rolled on to his back. He raised his spear before him as he rolled, to catch anything that might try to land on him. He saw the Longhead for the first time as it made its final leap down the pinnacle, and he was frightened at its speed, and surprised to see how much it was like a man. It leaped at him and did not try to dodge his spear, its arms out before it aimed for his throat. It caught itself on the spear, and the point went deep in its chest. Stonebreaker screamed as its fingers touched his skin and its scent poured over him, and then he felt strange in his chest and neck, and blackness fell over him.

Stonebreaker woke to the sound of eating. Though he felt no pain, he thought that the Longhead was still alive even though he had speared it, and was getting its strength back eating his flesh. So he must be dead. Only that would explain why he felt no pain. Then he smelled fresh meat, and his stomach rumbled. Can the dead smell, and be hungry? Stonebreaker opened his eyes.

He saw only the sky. He turned his head, and saw that the Longhead was not still alive. It had become a plains cat's meal. He, Stonebreaker, had killed a Longhead!

The cat was only a few spear-lengths away. His mouth watered at the sight of fresh meat, but Stonebreaker had to lie quietly and wait for the cat to have its fill, and hope that it would not try to eat him. He wanted to kill the cat as he saw it rip the guts from the Longhead—from *his* Longhead!—but he knew better than to try. One wet length of gut got wrapped around his spear, and the cat pulled at it and the whole body turned over in the dirt. Seen this way, the Longhead was just another animal, prey to spears and fangs. Why did men fear them so much? He thought of the blackness that had taken his senses from him when the Longhead touched him. Had the Longhead done that, even as it was dying? That would be a thing to fear.

The cat left the body. It stretched, and licked its mouth. Its claws dug long scars in the soft ground. It cleaned its face, and yawned, and then looked at Stonebreaker.

Its eyes met his before he could close them, and the cat hissed. He did not move, and the cat began to walk slowly toward him. Terrified, Stone-

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breaker rolled into a crouch and searched the bare ground for a rock. He found one and waited for the cat to leap.

But the cat did not leap. It stopped and snarled at him, and then it backed away, as the other cat had done, and ran off into the grass. Stonebreaker's fear left him and he let out a long sob and ran to pull his spear from the dead Longhead.

The cat feared him because he was so much like a Longhead. It must be so. It would eat a dead Longhead, but would not attack a live one. The Longheads were a thing to be feared, if cats ran from them.

Stonebreaker waited, and the cat did not come back. He ripped what meat he could find from the Longhead, and his stomach growled for more. The meat tasted like a man's flesh, but was not as hard to chew. He broke a rib loose and chewed at one end of it and set to work to get his trophy, the head, free from the body.

It was hard to do. His hands were strong from working stone, and they broke the backbone easily, but the tough string within the backbone would not break when he twisted it. He spat out the rib and ripped at what was left of the throat. He reached the backbone, pulled the head as far from the body as he could, and got his teeth on the string. He bit hard. Instead of the sweet taste he knew from the brains and backbones of other animals, he got a sour, foul juice that burned his mouth, and he jerked back. He spat, and snarled at the torn face, and drove a fist into it. The head snapped free and bounced along the ground. His bite had broken the string, though it fouled his mouth.

He went after the head, picked it up, and went to get his pouches of stone and his other spear. He tied the head between the pouches with a piece of gut from the Longhead, and threw the whole thing over his shoulder with his other spear. He tore off more ribs to take with him to the forest, and while he was doing that he saw for the first time the tools lying near the Longhead.

He picked up one of them. It was a crude thing, no more than a small stone edged on one side. It might work for skinning or cutting, but it was not a thing to hunt with. He looked at the rest. None of them would be any more deadly than a plain stone. Stonebreaker grunted. The Longheads might be like men, but they made tools no better than he had made when he was a child, and they made no weapons at all.

But if they could take the senses from their prey, what else would the Longheads need but tools to cut and skin with? He thought of the blackness again, and he shivered. He stood up and threw the tool away, and set off for the forest. While he ran he planned how he would tell the tribe about his kill. He thought of Blue Eyes then, and his mood darkened. Blue Eyes would not be happy with him for going on the plains. But would he punish the hunter who brought home the head of a Longhead?

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He saw clouds moving across the sky. The smell of rain was in the air again. The season had not turned, and he had enough stone to wait out the rains. Blue Eyes would see that he had done a good thing, a brave thing. Stonebreaker forgot the chance of punishment, and chewed happily on a Longhead rib.

II

Blue Eyes stared at the Longhead skull. He nibbled at it, and sniffed it. He said, "What is this? There is no scent left."

Stonebreaker touched the fat bulge at the back of the skull. "Longhead," he said.

"No," Blue Eyes said. "It is too small to be from so big an animal."

"It is a Longhead. I killed it."

"No," Blue Eyes said. "Longheads are bigger than giants, and they have clubs and spears as tall as a man. Old men tell us that."

"The body was as big as a man's body. You see the head."

"Was it a cub?" Blue Eyes said.

"No, no. It attacked me. We fought, and I killed it. It stalked me, when I went for stone. We fought, a long fight. It broke my spear. I tore out its throat. I killed it."

"There are no marks on you."

Stonebreaker had no answer for that. He sat in his tree beside Blue Eyes and watched the rain drip from the branches above him, and he said nothing.

"Who killed this?" Blue Eyes said.

"I killed it."

STATE OF THE ART

Science fiction is in a state of explosive growth, and many readers of Analog have expressed interest in articles that discuss science fiction itself, as a field of literature, learning, entertainment. So, starting next month, we will inaugurate a new feature in this magazine: *State of the Art.* It will consist of articles, discussions, ideas concerning all the many facets of science fiction—in literature, in the classroom, on theater and TV screens, even on computer readouts!

State of the Art will not appear every month, but we already have several pieces that make fascinating reading. The first one, an examination of academic scholarship in the field of science fiction by Lloyd Biggle Jr., will appear in next month's issue.

The Editor

"What weapons did it have?"

"It had. . . ."

"What weapons?" Blue Eyes said, and he put a hand on Stonebreaker's shoulder and shook him.

"No weapons. Its tools were small and weak, for cutting. It had no weapons."

"A Longhead with no weapons? Old men tell us . . . old men tell us what other old men told them," Blue Eyes said. "What old man ever saw a Longhead?"

"None."

Blue Eyes stared at the skull, and then he said, "If it is not a cub, and it had no weapons, why do men fear the Longheads?"

"It was not a cub. It attacked me."

"It had no weapons?"

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Stonebreaker hesitated. He should not have told Blue Eyes that the Longhead had no weapons. He said, "It had stones."

"It fought you with stones, and you killed it."

"Yes."

"No hunter kills a Longhead," Blue Eyes said.

Stonebreaker puffed out his chest. Blue Eyes at last saw how great a thing he had done.

"You are not a hunter," Blue Eyes said.

"I—I hunt," Stonebreaker said, confused, and suddenly demoralized.

"You make tools. Others hunt, you make tools. What do you hunt? How can you kill a Longhead?"

"My spear killed it."

"No hunter kills a Longhead," Blue Eyes said.

"What hunter tries?" Stonebreaker said, angry that Blue Eyes would not call him a hunter. He was also angry that he had been for Blue Eyes against Shortlegs. Shortlegs would call him a hunter.

"It is stupid to try," Blue Eyes said, and he ran his tongue over the top of the skull. "Yet, if you killed a Longhead, a hunter could kill many Longheads. Why do men fear them?"

Stonebreaker said nothing. To tell Blue Eyes of the blackness, he would have to tell him how the Longhead died. If he did that, he would be shamed.

Blue Eyes gave the skull to Stonebreaker. "Cut it open," he said. "We will eat the brains."

Stonebreaker cut out part of the top of the skull with one of his tools, and took out some of the brains. He tasted the light gray slippery stuff, and it was sweet. He gave some to Blue Eyes, who ate it and said, "Good."

Stonebreaker dug out more, and he and Blue Eyes ate together, and Stonebreaker's anger faded. They ate their way across the top of the brain, then into the center of it. There they found a tough, dark meat like the strange cord Stonebreaker had bit through in the backbone of the Longhead. One bite of this was enough to make Blue Eyes grimace and cram leaves in his mouth to kill the taste. He took the skull from Stonebreaker and groped inside it.

"Poison," he said, sniffing another section of the dark meat.

Stonebreaker cut open the back of the skull where the bone bulged to give the Longhead its name, and the meat there was light-colored and good to eat. Their hands and faces smeared with mashed brain, Stonebreaker and Blue Eyes cleaned out the skull, and found more good meat in the bottom. Mixed with it were strings of foul stuff that ran down to where the skull connected to the backbone.

When they were done, Blue Eyes said, "Give it to the ants."

Stonebreaker climbed down and dropped the skull near the roots of his tree. The ants that lived under the roots picked the skull clean quickly. They ate the dark parts the men had left, and were not harmed by them. Blue Eyes watched from the tree, and

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he said, "Not poison, but bad in the mouth."

Stonebreaker said nothing. He watched the ants prepare his trophy for hanging on his tree.

"The Longhead is not poison, and it had no weapons," Blue Eyes said. He was silent a while, then he said, "I have been on the plains."

Stonebreaker looked up at him, surprised.

"There is much meat on the plains," Blue Eyes said. "Men fear the Longheads, and do not hunt there."

"Yes," Stonebreaker said, uneasy to hear Blue Eyes talk about the plains and hunting.

"When Catkiller and the hunters are home," Blue Eyes said, "you will tell them how you killed the Longhead, and I will tell them that we will all kill a Longhead, and men will hunt on the plains."

Stonebreaker shivered. He had to tell Blue Eyes about the blackness now. It was better to be shamed now than dead later when the hunters learned of the blackness for themselves.

"No."

"What?" Blue Eyes said.

"There is a weapon."

Blue Eyes leaped on him, and knocked him down with his feet. Stonebreaker rolled backward and tried to stand, but Blue Eyes was on him, hitting him with his fists. Stonebreaker cowered behind his arms, and when Blue Eyes had spent his anger he lay on the ground and rubbed his bruises.

"Tell me," Blue Eyes said, and Stonebreaker told him. When he was done Blue Eyes said, "How does a Longhead bring blackness?"

"Who can say?"

"Was it the Longhead, or was the blackness from fear?"

"Not fear," Stonebreaker said.

Blue Eyes was quiet then. He picked up the Longhead skull and stared at it, and he looked at Stonebreaker. At last he said, "You will tell the hunters how you killed the Longhead, and I will tell them that we will hunt on the plains."

"Will I tell them about the blackness?"

"No," Blue Eyes said, and he dropped the skull and walked away toward the center of the camp.

Stonebreaker stood up. He picked up the Longhead skull and saw that it had mud on it. He wiped it clean, and then looked up at his tree for a place to put it.

He was still looking when Longhair and one of his tame chewers came by. Longhair said, "Killed a Longhead, you? Talk killed a Longhead. Here? Where?"

Stonebreaker gave him the skull. Longhair sniffed it while his tame chewer sat down in the rain among some bushes and dug for roots to eat.

"How do you know about the Longhead?" Stonebreaker said.

"Blue Eyes tells Onethumb. Kill it? How?"

"With my spear."

"Great thing," Longhair said. "No hunter does a great thing so."

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"None."

"Not Catkiller."

"Not Catkiller."

"Keep it?" Longhair said, holding it by a finger thrust through an eye hole. Stonebreaker did not answer. What else would a man do with such a trophy, but keep it?

"Give food for it," Longhair said. "Season."

"No. I don't want chewer food. I get meat for my tools."

"Chewers get fruit. Chewers climb good, get best fruit."

"Apes get the best fruit," Stonebreaker said. "Chewers get roots and bark."

Longhair had no answer for that, though Stonebreaker knew he was trying to find one. Neither man spoke for several breaths, while Longhair stared at the skull. Then he gave it back to Stonebreaker. "Food for season," he said.

"No."

"More."

"No," Stonebreaker said, and Longhair started to walk away. Longhair said something to the chewer, and it stood up, a piece of root in its mouth.

"Chewer food," Stonebreaker said, as Longhair turned to speak. "No."

Stonebreaker watched them walk away. From behind, it was hard to see which was man, which was chewer. Both had short legs and long arms. Both had small heads, and both had bodies covered with thick fur. Stonebreaker had heard men say that Longhair's mother had been a chewer, but he did not think Longhair looked enough like a chewer for that. He knew that Longhair himself mated with his female chewers, and none of the cubs the chewers had ever looked part-human, even human like Longhair.

Longhair was strange, but he was a man. He was awkward, but he did not waddle—like a water bird on land—when he walked, the way chewers did. When he ran, he ran like a man, and his knuckles did not touch the ground. It was hard for him to think of things, and he had trouble following even simple talk sometimes, but he could speak human words and put them together well enough to be understood, though he liked the simple chewer language better than human. He was the only man who knew the chewer language. He could not hunt, or make tools, but he could speak to the chewers and they worked for him and brought in so much food that Longhair had a place in the tribe as safe as Stonebreaker's. If it were not for the chewers, Longhair would have been sent out to live with the other males the tribe did not need, the males who were bad hunters and who could find no other place for themselves in the tribe. Longhair had found a place.

Stonebreaker set the Longhead skull on one of the lower branches of his tree. He stood back and looked at it, and then at the other skulls on the tree. There were the skulls of apes and chewers and men on his tree, and one skull from a giant. The giant skull had

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been the one that Stonebreaker liked the best until now. It came from the first giant anyone in the tribe had seen in Stonebreaker's lifetime. No tree in the camp had as many skulls on it as Stonebreaker's. Hunters kept some human skulls if they marked fights with other tribes worth remembering from one season to the next, but even these might end up as toys for children. Stonebreaker had not taken any of his trophies himself—except for the Longhead!—but he liked to pretend that he had. He liked to sit in his tree and look at them, and pretend that he was a hunter and had killed them all.

He got to know his skulls well. He knew the differences in shape and size, in teeth and jaws and eye holes among men and apes and chewers and giant. He saw that a man's skulltop was smooth, while a ridge of bone went from front to back along the top of chewer and giant and ape skulls. He saw that the eye holes of chewer and giant and ape were close together, and a man's were wide apart. He saw that men shared a thing with apes but not with chewers or giants, a space between the second and third teeth on each side of the upper line of teeth.

Stonebreaker noticed that the teeth of men did not change much in size from the front to the back of the jaw, while in chewers and giants the back teeth were bigger than the front, and in apes the front were bigger than the back. Stonebreaker saw that in all but men the front of the skull was mostly face, but in men the top of the skull rose to make a forehead.

How did the Longhead look next to the skulls on his tree? He picked it off the branch and held it face-upward in his hands.

The eye holes were wide apart, and the top of the skull was smooth and rose as high as the top of a man's skull.

The jaw was light and thin, like a man's jaw, and the teeth—he climbed into his tree and pulled off a human skull to hold beside the Longhead—the teeth were human, except that there were no spaces between the second and third teeth on either side of the upper row.

It was much like the skull of a man, except for the fat bulge at the back. It was strange to find an animal with a skull so human. Were the Longheads another tribe of men? Stonebreaker thought of the sour meat in the Longhead's brains then, and he thought of the blackness. What man could bring blackness, though? None. The Longheads were animals, he thought, and the plains were theirs and they kept men in the forest, but now Blue Eyes was talking about killing them. Stonebreaker did not like the plan. Blue Eyes might make him go along when the hunters went on the plains. He looked at his Longhead skull and wondered if he should have left it on the plains.

The hunters were home late the next day, with meat from a few small animals. Blue Eyes called in most of the sentries and gathered them with the hunters in the center of the camp.

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Stonebreaker told his story and said nothing of the blackness, and was much praised while the Longhead skull was passed around as proof of what he had done.

Shortlegs, once the leader of the tribe and now old and slow and a sentry, said, "A great fight. An old man is proud to hear it," and a prickling chill ran up the skin of Stonebreaker's back, and he forgot that the Longhead had not died in the fight he described and that one of his listeners knew it as well as he did.

Then Blue Eyes told them of his plan.

The older men were frightened. "The Longheads are great hunters," Shortlegs said.

"They have no weapons," Blue Eyes said.

The hunters made sounds of surprise, and Blue Eyes had Stonebreaker tell them about the tools he had found with the Longhead.

"They have no weapons," Blue Eyes said. "And they do not come in the forest."

"They do not need to come in the forest," Shortlegs said. "They have meat."

"They fear the forest," Blue Eyes said. "They fear death from the trees, the tree cats and the tree snakes that will fall on them, and they have no weapons. We have weapons."

Shortlegs said, "All our fathers—"

"We are better than our fathers. We have fought the cats and the chewers and the snakes. We have grown strong in the forest, and the Longheads are weak. A man who is no hunter goes out alone and kills a Longhead!"

The hunters liked the plan. Stonebreaker listened while they decided, and he heard the hunger in them. Only Catkiller was quiet, as though he were thinking of a plan of his own. A tall, thick-armed man whose beard was not yet full and not yet dark, Catkiller looked long at the skull and then he said to Blue Eyes, "It is small."

"The Longheads are weak," Blue Eyes said.

"Is it a cub?" Catkiller said to Stonebreaker.

"No, it fought me."

"Something bothers me," Catkiller said.

"The Longheads are weak," Blue Eyes said.

"Men have always feared the Longheads," Catkiller said, "but there is meat on the plains, and none in the forest. I will go to the plains, if this one goes with us," and he pointed to Stonebreaker.

"He will go," Blue Eyes said.

The next morning Stonebreaker woke to find the rain gone, and he was fearful to think what waited for the hunters on the plains. But, though the sky was clear and many animals were on the plains, the men reached the pinnacle without seeing a Longhead, and when Blue Eyes and Stonebreaker climbed the pinnacle and found the nest of the Longhead that Stonebreaker had killed, the nest was empty.

The nest was far out on one side of

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the pinnacle. A line of handholds led to it, and Blue Eyes sent Stonebreaker to see what he could find in the small hollow filled with branches and grass. Stonebreaker started along the handholds, but had to stop at the third one, his feet braced on a narrow ledge. The Longhead, he saw, had not used its feet to get to the nest, because below the rest of the handholds there was nothing he could see to stand on. A man could not reach the nest, even a man like Stonebreaker, who spent much of his life in trees, who was a good climber and not afraid of heights. An ape could have done it, with its long arms and short legs, with its hands for feet, but the Longhead was not an ape. It was strange, he thought, that the Longhead climbed like an ape.

Blue Eyes tried, but he could not reach the nest either. They climbed to the top of the pinnacle, and Blue Eyes said, "The rain stopped in the night, and there is no scent. No Longhead here since the night?"

"Or since I killed the one I found here."

"Where are they?" Blue Eyes said. He looked out across the plains and grew excited at the many animals he could see. He watched a long time, and looked in all directions that did not lead back to the forest. "How far can we go?" he said. "How far to fight a Longhead?"

"We do not have to go," Stonebreaker said. "They will come back. Will they leave this place?"

"We will find them, and I will see how it is to kill a Longhead."

They went down to the hunters, and Blue Eyes told Catkiller to get meat. Catkiller said, "There are no Longheads?"

"Not here. It may be that you will see them."

"This one—"

"He will stay with me and we will watch from the rock," Blue Eyes said.

"He says the Longhead had no weapons," Catkiller said. "Hunters have weapons."

"If the Longhead had weapons, how could one like this kill it?" Blue Eyes said. "Go, and hunt."

The sun was far in the west before all the hunters were back at the pinnacle. They had killed many kinds of animal, and they carried more meat than Stonebreaker had ever seen at one time. Though there was much blood on them, they were hungry. They talked about the feast they would have in the forest, and they praised Blue Eyes for taking them where there was so much meat. Stonebreaker listened, and he felt uneasy.

They started for home. Catkiller walked with Blue Eyes, and Stonebreaker came behind them. Catkiller said that the hunters had seen no Longheads, but that the animals they had stalked had run at the sight of them, and a pack of dogs had followed them to get the parts of their kills they left behind.

"They knew us as hunters before they saw us kill," Catkiller said, "yet they did not fear our spears until I killed one of them."

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"Men do not hunt here," Blue Eyes said. "The animals do not know your spears."

"They knew us as hunters," Catkiller said. "It bothers me."

"The dogs did not know you. Men do not hunt here."

"The dogs knew us."

Blue Eyes came up close beside Catkiller, so that his head was hidden by the meat across Catkiller's shoulders, and he said something that Stonebreaker could not hear. Then he moved away from Catkiller, and they walked the rest of the way to the forest and talked no more about dogs.

The season changed. The hunters went to the plains every day for several days. They went no farther from the forest than they had the first day, and they saw no Longheads. Stonebreaker wondered where the Longheads were, and he thought of the blackness sometimes, but he never went back to the plains. The hunters used up many spears and cutting tools now, and he was busy making new ones, and he sent his helper Crosseyes to the pinnacle for stone. At the end of the day he would see Blue Eyes and Catkiller standing apart from the other men, talking, and he would fear what they were planning. His fear was not mistaken. One sunset Blue Eyes split the hunters into two groups, one to stay with the women and children and hunt for them, and another, of the youngest and fastest hunters, to hunt for Longheads. Blue Eyes told Stonebreaker, "Crosseyes will make tools for the hunters of meat. You will come with the hunters of Longhead."

III

They started with the first light, and Blue Eyes led them to the plains a new way. They went north, toward the territory of their neighbors, the Irkw, and stayed in the forest until half the day was gone, and then they went on the plains. The country here was much like the country to the south, except that no rocks broke the grass. The trees that grew here were like the ones around the pinnacle, strange and low-limbed, with branches that curved toward the ground in the shape of roots, so that the trees looked upside-down. They were scattered widely across the plains, and did nothing to comfort Stonebreaker as he watched the forest shrink behind him.

Blue Eyes said that taking a new way might bring them to Longheads, but they walked east the rest of the day and saw none. They hunted when the sun was low, and while they ate the kill one of the hunters said, "Where will we sleep?"

Stonebreaker had been wondering the same thing all day, so the question did not surprise him, but he saw that it surprised the other hunters. They looked around the plains for shelter and did not like what they saw. They were no happier when Blue Eyes led them to the largest of the upside-down trees and said they would sleep there. The hunters grumbled, but it was too far to walk back to the forest before dark and so they climbed into the tree

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BIOLOG

by Jay Kay Klein

Harlan Ellison

Long considered science fiction's enfant terrible, *Harlan Ellison may well wind up an elder statesman of the field. What is certain is that Harlan first became known in science fiction as a teenage fan terror in his native city of Cleveland. Not many years later he was competing with Frank Herbert and Robert Silverberg at the 1956 World Science Fiction Convention for a Hugo as Most Promising Writer.*

Since then, Harlan has won six Hugos and shared a seventh for the motion picture, A Boy and His Dog, *the original novella of which received a Nebula Award from the Science Fiction Writers of America. He has won two other Nebulas, including the one given him this past April for his short story, "Jeffty Is Five," and numerous other awards, including honors from the Writers Guild of America.*

Starting his career in New York City, Harlan moved to Chicago, where he edited a men's magazine and a line of mainstream paperback books. Finally reaching California, he is now firmly a part of the Hollywood scene. He has written many movie and television scripts, but now has foresworn television and is concentrating on motion pictures alone. Harlan lives in Sherman Oaks, like many Hollywood figures. Unlike them, his beautiful home is filled with some 36,000 books.

Generally taking firmly expressed stands on controversial issues, Harlan has often found himself the target of public rudeness and hostility. One very reactionary man even shot at him during a campus lecture in the Southwest.

August 1970 saw Harlan's first appearance in Analog, *in collaboration with future editor Ben Bova, with a novelette titled "Brillo."*

Harlan was a prime mover in the drive to change science fiction's preoccupation with technology to broader themes dealing with human relations, a movement labeled "The New Wave." A substantial embodiment of this effort is his immensely popular (and award-winning) Dangerous Visions *anthologies.*

Harlan has been a fighter all his life, from street gangs in Brooklyn (which he joined to gather material for a novel) to writers' rights in Hollywood. Currently he is embroiled in securing passage for the Equal Rights Amendment, and plans to use his Guest of Honor position at the 1978 World Science Fiction Convention in Phoenix as a platform to advance ERA in Arizona.

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after Blue Eyes and Catkiller. Stonebreaker climbed with them and wondered if the hunters would go on in the morning.

The night was full of terror. Great roars came from the north, sounds of fury that ended in terrible coughing noises. Answering roars came from the east, and soon Stonebreaker caught a scent on the wind like cat, but strange. Could a cat make so fearsome a noise?

Then it was quiet for a time, and Stonebreaker moved his head back and forth to hear what sounds the small night wind might bring. He heard steps in the grass.

The hunters also heard the steps. They moved on the branches to face the sound. The wind came stronger and brought the scent of chewer, and then the steps came closer, and stopped.

"Hunters? Longhair is," came a voice from below.

"What?" Blue Eyes said.

"Longhair is. And chewers. Dark. Come up?"

"You are stupid," Blue Eyes said. "Come up. Be quiet."

Longhair and his chewers settled on the branch below Stonebreaker.

"Hunters far. Chewers slow. Dark."

"Be quiet," Blue Eyes said.

The men listened, and breathed the wind. Nothing followed Longhair to the tree. The men relaxed, and Stonebreaker heard sounds of sleep. He fell asleep himself only when the wind died, and woke when it was fresh. Once he woke to the smell of Longhead.

He listened to the wind. The Longhead smell came stronger and then he heard quick steps in the grass. An animal cried out, and the sound was followed by the noise of many animals running and snorting. The sound of their hooves faded to the north.

Stonebreaker smelled blood. Longheads hunted at night.

The men were awake around him, and Blue Eyes whispered so quietly that Stonebreaker barely heard him over the wind, "Longhead?"

"Yes."

Stonebreaker did not hear anyone sleep after that, even when the smell of blood and Longhead was gone.

In the morning the hunters wanted to go back to the forest, and Blue Eyes said, "Go. Tell Shortlegs you were afraid. Catkiller and the Stonebreaker and I will kill Longheads."

One of the hunters said, "You shame us. Any man would go back from here. There are great cats. The trees are small. You did not say the Longheads hunted in the night."

"I did not know how they hunted," Blue Eyes said. "If they hunt in the night, they sleep in the day. We will find where they sleep. If a man sees what he needs, he takes it. The Stonebreaker has killed a Longhead and we hunt where it hunted. Other Longheads will come to hunt there and we will go back to hunt in the forest if we are afraid to kill them. A man sees what he needs, and goes on."

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The hunter said, "We will wait for the Longheads to come back, and then we will kill them."

"Go. Wait. Tell Shortlegs you were afraid."

The hunters did not move or speak, and Longhair said, "I come."

Blue Eyes said to him, "What do you want with Longheads?"

"Hunters get meat. Leave chewer food. I come."

"Shortlegs will keep you," Blue Eyes said.

"I come."

"What?" Blue Eyes said. "Will you mate with a Longhead?"

"Might," Longhair said.

Blue Eyes hissed and showed his teeth. He said to the hunters, "Longhair will come with us, and he does not hunt. Longhair shames you," and then he walked away. Catkiller and Longhair went after him, and the chewers walked awkwardly after Longhair. Stonebreaker wanted to stay with the hunters, but he feared Blue Eyes too much to try. He left the hunters and caught up with Longhair. He looked back once, and saw the hunters going home.

Blue Eyes followed the scent of the Longhead to the place where it had killed. He squatted by the crushed, bloody grass and sniffed the ground. Whatever the Longhead had killed was gone, the parts it had left dragged away by dogs that left their scent on the blood. Blue Eyes stood up and looked north, the direction the Longhead had gone, and Stonebreaker saw that his face was still happy.

Catkiller said, "What will they tell Shortlegs?"

"Who can say?" Blue Eyes said.

"Will they tell him we are dead?" Catkiller said.

"Who can say? I am not dead, and I will not die."

"One day you will die," Catkiller said.

"I will kill a Longhead and come back to the forest. Much is in front of us, and the hunters do not see it. They are stupid, and they will be shamed when we come back."

"Do you not fear the Longheads, and the blackness?" Catkiller said.

"I will live, and the Longheads will die. Much is in front of us."

"A Longhead is in front of us," Catkiller said.

"No more?"

"I am a hunter. I see a Longhead."

"Will you go with the hunters?"

"No," Catkiller said. "Hunters will go where there is meat. If you say we must kill the Longheads to hunt on the plains, then I will do it."

"Good."

They followed the scent north and east. Often it was crossed by the cat scent that Stonebreaker had smelled in the night. Then they kept close to trees, ready to run for them if they saw the animals that roared with such fury.

They lost the scent by a small lake. The ground near the lake was muddy, and many kinds of animal had left tracks in it. Birds walked in the shallow parts of the lake, and the strong smell of their droppings made Stone-

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breaker's eyes water. Men and chewers went carefully around the lake, because the grass was thick and high there, and their noses were filled with strange scents, but even so they walked into a pack of great cats.

These were the biggest cats Stonebreaker had ever seen. They lay in the grass and their fur was hard to see against it. Only the black on their muzzles and on the tips of their tails and ears stood out sharply. Their eyes were yellow.

The cats were slow to move, as they had full bellies, and men and chewers all reached the nearest tree unharmed. The cats followed. Longhair walked out on a branch above them, and let water. The cats sniffed at the water, and moved away from the tree. Longhair made stupid noises at the cats, and the other men hissed at him. At last the cats went back to their nest, and the men and chewers left the tree. They found the Longhead scent again east of the lake, going north. They followed it the rest of the day, and the country changed from what they had known so far. The grass grew higher and stiffer than before, and its tips were as sharp as thorns. More trees grew, and other kinds besides the upside-down tree. There were short trees with blue-gray leaves as sharp and stiff as the grass, and tall straight trees with leaves like feathers. These feather trees looked like better shelter than the upside-down trees, and at sunset the men killed a small animal and climbed into one and ate while the sky darkened.

They had found no place where the Longhead had slept or hunted. Catkiller said, "The Longhead came far in one night."

"Far and more," Blue Eyes said. "Why does it run so far? There is meat everywhere. Why does it run?"

"Who can say?" Stonebreaker said. "The other had a nest."

"The other had a nest, and this one runs," Blue Eyes said. "Does it stop at dawn? Does it run in the day?"

No one answered. Below them, where Longhair and his chewers were, there was grunting and sighing, and the sound of feet on bark. Longhair was trying to mate with one of the female chewers, but the up-growing limbs of the feather tree did not give him much room to move. Stonebreaker felt lust rise in him, though he had no desire for chewers. He thought of the women of the tribe, now far away. He thought more about them, and then he said, "It runs to mate."

"What?" Blue Eyes said.

"When the rains stop, animals mate," Stonebreaker said. "There was no female with the Longhead I killed. The females are far away. It runs to mate."

"It runs to mate," Blue Eyes said. "Good. Other Longheads will run to mate, and if we do not catch this Longhead there will be more."

Cats roared that night, but the wind brought no smell of Longhead. Nothing bothered them in their tree, and in the morning they set out again on the trail. The sun was not yet high when

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they came to a feather tree where the Longhead had slept. Near the tree were droppings like those of a man, and Blue Eyes and Catkiller decided that the Longhead had left them. Later they found signs that the Longhead had killed.

They followed the scent all morning, and the land changed more. It rose to the east and north, and it grew greener than any country they had seen since they had left the forest. There were many small trees, and small animals that lived in them. The animals saw them as Longheads and feared them, as all animals they had seen on their hunt had done, except for the great cats. The great cats were so big and fierce that nothing frightened them, Stonebreaker thought, not even Longheads or men who looked like Longheads.

Late in the morning they met another pack of these cats, this time a pack with bellies loose and empty. Stonebreaker and Blue Eyes and Catkiller and Longhair were fast enough to reach the closest feather tree, but the chewers were not. The cats caught them and killed them and stripped their bones bare, and then came to the tree the men were in, and stared up at them.

Longhair screamed at the cats. He broke limbs from the tree and threw them at the cats. He wet himself in his fury, and threw his droppings at the cats. The cats snarled, and did not move away until a herd of small grazing animals caught their noses.

The men waited until they were out of sight, and then got away. They passed the bones of the chewers, and Longhair made sad noises. He was angry when he saw birds picking at the bones, and he ran at them and threw stones. He sat down and nibbled at a bone. Catkiller and Blue Eyes did not notice him. Longhair might have been left behind if Stonebreaker had not called to him. Longhair licked at the bone and left it, and ran to catch up.

The land went higher, and Stonebreaker's legs began to ache. They came at last to a down slope that led to a wide stream. The stream moved fast, and the Longhead scent ran toward the only place Stonebreaker could see where the stream could be crossed. Across the stream the land rose again, going on and on toward brown hills. Here the land was green, and the sound of the stream made Stonebreaker thirsty.

They found many Longhead scents on the slope. Some were fresh, and all pointed toward the stream crossing.

"They run in the day," Catkiller said.

"It is mating season," Blue Eyes said.

The crossing was a place where many large rocks stuck out of the stream close together. Blue Eyes led them across, jumping from one rock to the next. On the other side there was only one Longhead trail going away from the stream, toward the north.

"A Longhead will come," Blue Eyes said, "and we will see how it dies."

Stonebreaker and Catkiller hid in

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the grass on one side of the trail, and Blue Eyes and Longhair on the other. They waited, and a Longhead came. They leaped out as it passed them, and surrounded it.

The Longhead crouched in the circle of men, and then it leaped for the space between Longhair and Catkiller. It moved faster than any animal Stonebreaker knew, except a cat. Longhair pushed his spear at it awkwardly. There was fear on his face, but he did not fall back, and his spear went into the Longhead's side. The Longhead retreated into the circle. At the sight of blood Longhair lost his fear, and he came at the Longhead. Catkiller moved with him.

"I will kill it," Blue Eyes said, and the other men stopped where they were.

The Longhead looked at its side, and then it looked at the spear Blue Eyes held as he came toward it. The Longhead's hands were empty, and much bigger than a man's hands. Stonebreaker looked at its eyes and wondered at them. The Longhead's eyes were not like the eyes of other hunting animals. They were nothing like the eyes of the great cats. No strength or courage showed in their darkness, only fear.

The Longhead moved, first to one side and then the other, too quickly for Blue Eyes to follow with his spear. It leaped at him, past his spear, and got its hands on his throat. His back and legs stiffened, and then he fell. Catkiller was on the Longhead as it let go of Blue Eyes and his spear went deep in its back. It fell on Blue Eyes while Stonebreaker and Longhair put their spears into it, and it died.

Catkiller dragged the body off Blue Eyes, who lay on his back with his eyes open. Only white showed in his eyes. Catkiller said, "When will he wake?"

"Soon," Stonebreaker said.

They pulled their spears from the body, and rolled the body over so it lay next to Blue Eyes. They looked at what they had killed.

It was thinner than Blue Eyes, and its legs were longer than his legs, but otherwise it was much like him. Stonebreaker knelt beside it, and sniffed. When the Longhead had touched Blue Eyes, Stonebreaker had smelled a strange thing, the smell that lightning makes. Now he smelled it again, but much weaker, and he found that it came from the Longhead's hands.

"What?" Catkiller said, and knelt beside him.

Stonebreaker held one of the dead hands palm upward in his. The skin was hard and dark and had large pores in it rather than the fine lines of a man's palm. It was damp, and Stonebreaker licked it and the taste was sour. He let the hand fall back to the ground. The Longhead was a strange animal, he thought, to be so much like a man.

The Longhead wore a pouch of animal skin around its waist, and Stonebreaker opened it and found tools as simple as the tools of the first Longhead he had killed.

"Not a man's tools," he said, and gave them to Catkiller.

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log

A Calendar of Upcoming Events

1-3 August
Fourth Workshop on Computer Architecture for Non-numeric Processing at Syracuse, NY. (IEEE CompSoc). Info: Prof. P. Bruce Berra, Industrial Engineering and Operations Research, 441 Link Hall, Syracuse University, Syracuse NY 13210.

21-25 August
SIGGRAPH 78, Fifth Annual Conference on Computer Graphics and Interactive Techniques (IEEE) at Atlanta, Ga. Info: R. L. Phillips, 213 Aerospace Engineering Bldg., University of Michigan, Ann Arbor MI 48109.

28-31 August
Annual Meeting of the American Section of the International Solar Energy Society at Denver, CO. Info: Amer. Sect of Int. Solar Energy Soc., 300 State Rd 401, Cape Canaveral FL 32920.

30 August-4 September 1978
IGUANACON (36th World Science Fiction Convention) at the Hyatt Regency, Phoenix, AZ. Guest of Honor—Harlan Ellison; Fan Guest of Honor—Bill Bowers; Toastmaster—F.M. Busby. Registration—supporting (Hugo voting and reports) $7, attending (all privileges) $20. This is the big one when all the SF family gather. Panels, talks, films, masquerade, art show, hucksters. The Hugo Awards and the John W. Campbell Award for Best New Writer will be presented. Selection is made by members of the convention so join and get a chance to vote. Info: Iguanacon, Box 1072, Phoenix AZ 85001.

15 October
Deadline for entries in the NESFA Annual SF Short Story Contest. Write for rules BEFORE submitting entries. Info: New England Science Fiction Association, Box G, MIT Branch PO, Cambridge MA 02139.

23-27 August 1979
SEACON 79 (37th World Science Fiction Convention) at Metropole Hotel, Brighton, U.K. American Guest of Honor—Fritz Leiber; British Guest of Honor—Brian Aldiss; Fan Guest of Honor—Harry Bell; Toastmaster—Bob Shaw. Registration $7.50 (supporting) to 31 December 1978, $15 (attending) to 31 December 1978. Info: Seacon '79, 14 Henrietta St., London WC2E 8QJ, U. K.

ANTHONY R. LEWIS

Items for the Calendar should be sent to the Editorial Offices, ***four months*** *in advance of the issue in which you want the item to appear.*

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"But it is much like a man," Catkiller said.

"It hunts like an animal. Its tools are like a chewer's tools. Chewers are stupid, and this is like a chewer, but it eats meat."

"It is more like a man than a chewer," Catkiller said.

"It is an animal. I will show you," Stonebreaker said, and he took out his tools and cut open the Longhead's skull. He showed Catkiller the dark, sour meat in the brain of the Longhead. Catkiller tasted it and said, "It is strange."

"No man has such meat in him," Stonebreaker said.

They shared the good brain meat with Longhair, and cut up the rest of the body. They ate the heart, and saved the liver for Blue Eyes. Stonebreaker found more of the sour meat leading from the backbone down the arms to the hands.

When Blue Eyes woke he went to the stream and drank. He put his face in the water, and pressed his hands to his forehead. He felt weak, he said.

He ate the liver and other meat, and he said he felt better. He went to look at the Longhead. He said nothing about the way it had died, but told them to throw it in the stream, and after they had done that he sent Catkiller and Longhair to kill an animal to leave in its place.

"Longheads will come in the night," he said. "If they find a dead Longhead they will come to find what killed it, and I do not want to fight them at night."

Stonebreaker sat with him while the others hunted. Blue Eyes sat with his feet in the stream, and Stonebreaker thought he slept at times.

The sun had almost set when Catkiller and Longhair came back with their kill, a large brown animal with long twisting horns on its head. They put it where the Longhead had died, and cut it up and spread blood on the ground around it. They ate some of the meat, and then Blue Eyes led them to the stream, and into it up to their knees. They walked south in the water until Blue Eyes decided they were far enough from the Longhead trail for safety, and he led them up the bank to look for a tree.

The sun had set, but the sky was still light. They walked east, into the wind. Strange scents came on the wind, as always in this country, and Stonebreaker gave no thought to them. Then Blue Eyes stopped, and pointed at something for Catkiller to see. Stonebreaker came up beside them and tried to see what they were looking at. Sticking up from the grass ahead were things he thought were tree stumps. There was not enough light to see the stumps clearly. Then one of them moved, and Blue Eyes said, "Giants."

Stonebreaker was afraid. He had seen the dead giant the skull on his tree had been taken from, but he did not think it had been anything like the animals he saw now. He thought these must be twice the height of a man, with chests and shoulders as wide and powerful as an ape's. He could not see

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their teeth, but he knew what they were like.

"Do giants eat meat?" he said.

"Who can say?" Blue Eyes said.

Blue Eyes turned south. Stonebreaker and Catkiller went with him, but Longhair stayed behind and watched the giants. Blue Eyes called softly to him, and he did not move.

Blue Eyes went to get him. Stonebreaker was sure that the giants turned their heads to watch Blue Eyes, but they did not follow when all the men went on south together.

Blue Eyes said, "He sees them as big chewers."

Longhair looked back at the giants while he walked, and when they were lost from sight he whined and tried to go back. Blue Eyes dragged him along. When he turned him loose to climb into a feather tree, Longhair ran off.

IV

Longhair did not come back that night, and in the morning they went to look for him. Blue Eyes had his strength back. While they walked he said, "A man will not kill a Longhead alone in the open, unless he is lucky like the Stonebreaker."

"No," Catkiller said.

"We know how to kill the Longheads," Blue Eyes said. "We will find the mating ground, and the next mating season we will go there before the Longheads, and we will kill them all as they come."

Catkiller said nothing for a few heartbeats, then, "This is a great plan."

"I saw it in the night, as I slept," Blue Eyes said. "All the Longheads will die."

"It is a great plan," Catkiller said again, and even Stonebreaker was excited, though he knew there were many risks in the plan. To kill all the Longheads! Had there ever been such a plan?

Blue Eyes showed his teeth. He was pleased with himself and with Catkiller's praise. He punched Catkiller lightly on the chest, and then Stonebreaker. Stonebreaker was surprised by the touch. It was a gesture hunters used among themselves, and never before had Blue Eyes treated him like a hunter, not even when he killed the Longhead. The touch pleased Stonebreaker greatly, and it showed him how happy Blue Eyes was with his plan.

Longhair's trail was short, and not hard to follow, as Longhair had wet himself many times along the way. They found him with the giants at the banks of the stream. The giants were feeding on water plants. They ripped the tough stalks open with their teeth, and ate the soft inner parts. They pulled up roots as thick as a man's arm and ate them as easily as a man would eat a soft fruit. They ate much, and they ate fast, and they left behind a wide muddy trail scattered with the remains of plants.

The giants were not fully twice as big as a man, as Stonebreaker had thought the day before, but they were still much bigger than he was. His head came no higher than their bellies.

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Their faces were apelike, but with jaws wider and longer, and teeth much bigger, than an ape's. He tried to look unafraid as he walked toward them, but it was not easy.

Longhair sat with some males, and Stonebreaker thought they were talking, but he could make no sense of the noises they made. One of the other giants saw the men approaching, and called out. Others stopped eating and came to challenge the men. Each one carried a rock as big as a man's head, and swung it in its hand as easily as Stonebreaker would carry a cutting tool. This was how they lived on the *plains without spears*, Stonebreaker thought. Many of them throwing such rocks at once could kill any hunting animal he knew. Some of the giants raised their rocks as if to throw, and Blue Eyes stopped. He called to Longhair, and Longhair came over to him.

"Come with us," Blue Eyes said.

"Good here," Longhair said. He looked back at the giants.

"They are not chewers," Blue Eyes said. "Giants. Come with us."

"Big chewers. Good here," Longhair said. He showed his teeth. "Stay. You stay."

"No," Blue Eyes said. "We hunt the Longheads."

"Stay. Big chewers good. Men good."

"Come with us."

"Mate big chewers," Longhair said, and he walked back to the giants. He sat down with them and began making noises with them again. Stonebreaker thought that Blue Eyes would be angry, but Blue Eyes said, "Longhair is a strange man," and led them away from the giants. Blue Eyes was too pleased with his plan, Stonebreaker thought, to be angry with Longhair.

They went east, and then north, and found the Longhead trail. There were no fresh scents on it. All the Longheads had gone to mate.

The trail led north along the stream. The country was green, and they found fruit to eat and did not have to hunt. The brown hills east ran alongside them as they walked, and ahead they saw more hills just as brown, yet strange, because above them the sky *itself was brown. The trail and the* stream turned northeast, toward the place where the two lines of hills met, and Stonebreaker watched the sky. He wondered what made the sky the color of the hills. He saw no dust blowing across the hills, not to the north or the east. He thought of fire, and was afraid, but nothing grew on the hills that might burn, and his fear went away. Neither dust nor fire made the sky brown. It was strange country.

The day passed, and the two lines of hills came together. Where they met was a valley with a lake in it. The lake was fed by a waterfall in the northern hills, and from the lake ran the stream the Longhead trail followed. There were caves in the northern hills where they came nearest the lake, and Stonebreaker saw Longheads in the caves, and many more Longheads below the caves on the lake shore. They had found the mating ground.

They climbed a small hill at the

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mouth of the valley to watch the Longheads. The brown soil of the hill was soft and fine, finer than sand, and it tired them to walk in it. Their feet raised dust that dried their throats and stung their eyes. The dust settled on them, and when they lay down at the crest to watch the Longheads their skins were the color of the hill beneath them. The Longheads would not see them.

The Longheads in the caves, Stonebreaker saw, were females and their young. He looked at the Longheads below the caves, and he saw no mating. Were all the ones outside the caves males? He looked carefully, and found this was so, except for one group of females farther down the shore and well away from the males.

They watched, and soon a female left its group by the lake and walked toward the nearest males. Two males came forward to meet the female. Then several females and young came down from the caves and stood near the two males.

The female sat down in the grass, and the two males began a dance. The female watched as they leaped across a patch of bare ground worn in the grass. Stonebreaker thought that many males had danced there. He saw stains on the soil that he thought were blood, and he waited for the males to fight.

But the males did not fight. They leaped at each other, and away, then back at each other and away again, round and round, while the females and young from the caves made a ring around them. The dance ended when each male leaped for the other's throat, and both fell stunned to the ground.

The Longheads waited. There had been some noise from the other males while the two danced, but now all were silent. At last one of the two stood up, and walked toward the female who sat in the grass, and did not look at the one that still slept. That Longhead was killed by the females and young. They cut its throat with their tools before it could wake, and it bled to death while the male it had danced with and the female it had danced for climbed to one of the caves together. Then Stonebreaker could no longer see them. He knew they had gone to mate.

The dead Longhead was cut up, and its parts were taken to the caves. Before long, two more males danced for another female, then two more, and two more after them, for other females, and there was more fresh meat. Then the females that were still by the lake went into the caves, and none of the males followed. The meat was not for them, Stonebreaker thought, only for the females and their young. They had enough meat for the day, and so they would not mate again until they were hungry. Stonebreaker shivered. He was happy that he was not one of the Longhead males who had to wait for a chance to mate or die.

The males went to the far end of the lake. They drank, and they waded. They found things to eat in the water. Stonebreaker wondered if they ate

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plants or caught fish. Did the Longhead weapon work in water? He thought how hungry they must be to eat fish or water plants, and not leave the valley to hunt. If the females did not have enough meat, they would come out of the caves, and any male that left to hunt would miss a chance to mate. Stonebreaker thought that he would go to hunt and never come back, if he were a Longhead male.

Blue Eyes said, "The Longheads are not like men."

"They are animals," Stonebreaker said.

"They are animals, and a female can kill as quickly as a male," Blue Eyes said. "The females live here. They need the males to mate, and they do not need them to hunt."

Catkiller and Stonebreaker said nothing. Blue Eyes said, "They eat the males. Something bothers me."

What bothered Blue Eyes also bothered Stonebreaker, but he knew what it was. It was fear at the power that the females had over the males among the Longheads. Had Blue Eyes never felt fear before?

"The females live here, and the males live on the plains and come here to mate," Blue Eyes said. "We will not kill the males. We will kill the females and young after the mating season. There will be no more Longheads."

"It is a great plan," Catkiller said.

Blue Eyes said, "If the hunters were here. . . ."

Stonebreaker and Catkiller waited for him to say more, to hear what he would do if the hunters were with them, but when he spoke again he said, "The Longheads are not like men."

Stonebreaker thought that something more than fear bothered Blue Eyes, and he said, "They are animals. They have no tools, and they do not hunt together."

And then he saw what bothered Blue Eyes. He said, "There is no leader of the Longheads."

Blue Eyes looked at him. Stonebreaker said, "The Longheads are stupid, like chewers. They have no leader, and they make no plans."

"Yes," Blue Eyes said, and he showed his teeth. "The Longheads have no leader." He looked at Catkiller and said, "The Stonebreaker knows Longheads."

"Yes," Catkiller said, and Stonebreaker felt good.

"They make no plans," Blue Eyes said. "I will make a plan, and kill them. If the hunters were here. . . ."

"The hunters will come," Catkiller said. "We will tell them about the Longheads."

"I will make a plan without them," Blue Eyes said. "We will kill the females when the males are gone."

"What?" Catkiller said. "You and I and the Stonebreaker?"

"I will make a plan," Blue Eyes said, and Stonebreaker did not feel good any more. He was sorry that he had said anything about leaders and plans at all.

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The day was near its end. They went down the hill to the grasslands and drank at the stream and found fruit. Stonebreaker took his fruit to the stream and waded in the water to cool his legs while he ate. Blue Eyes and Catkiller came in after him.

They ate and belched and threw water on themselves. They stayed at the stream until the sun was down, and then found a feather tree to sleep in.

Stonebreaker could not sleep. He worried about what Blue Eyes had said. He waited and hoped for sleep, but his eyes came open often, and he watched the sky.

The sun was long set, but he did not see many stars. He waited, and the sky got no darker. Finally he moved to the end of his branch and looked around the horizon as best he could. To the northeast, where the sky had been brown in the day, there was a bright yellow mist. It spread across the sky, and he could see no stars in the north or east. He was terrified, and all he could think of was fire. If there was fire in the sky, it could spread over all the land, and kill everything it touched. He whined, and a whisper answered him, "Be quiet. Blue Eyes sleeps."

Stonebreaker said, "The fire—"

"Be quiet," Catkiller said. "I see no fire."

"There is fire in the sky."

"How can there be fire in the sky? There is light. Do you see fire?"

Stonebreaker looked northeast. He saw no fire, but he could think of nothing else that could make light there. The moon was not up. He said, "What is the light?"

"Who can say? I see no fire."

Later, Blue Eyes woke, and he took the light for dawn. Catkiller told him it was not, and no one tried to sleep after that, though Stonebreaker napped at times despite his fear. When dawn came the strange light faded, and they saw below the place it had been a great mountain. As the sun came up, the mountain was hidden by mists that rose from the plains, but not before Stonebreaker saw the smoke that came from the mountain's top. Then the mists and smoke came together and made the sky the way it had been the day before.

"There is no fire in the sky," Stonebreaker said, his fear replaced by curiosity, "but somehow a mountain burns."

"How will a mountain burn?" Blue Eyes said.

"There is smoke on the mountain," Stonebreaker said. "Something there burns."

Blue Eyes looked a while longer at the brown sky, and then he led Stonebreaker and Catkiller back to the hilltop overlooking the Longhead mating ground. Blue Eyes did not forget the burning mountain. Many times that day, as they watched the Longheads, he talked about it, and Stonebreaker grew tired of saying "Who can say?" to his questions.

It was the middle of the day before any females came out of the caves. Blue Eyes said he wanted to see how many females there were to be killed,

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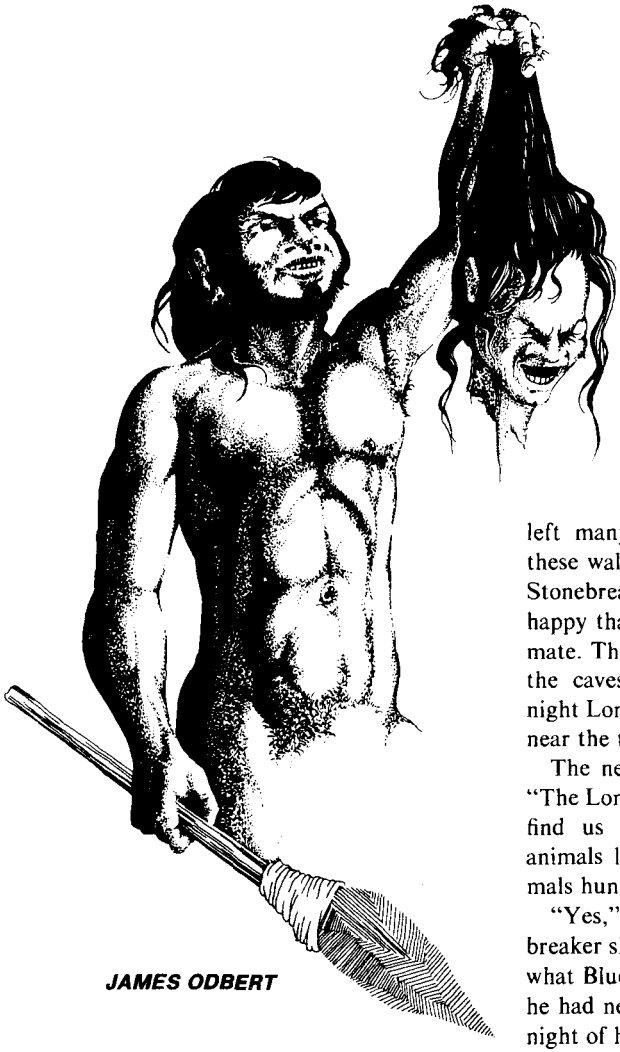

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but fewer than the men had first seen the day before came down to the lake. Stonebreaker watched the females and thought that only the ones that had not mated, and the ones that came with their young to kill males, had left the caves. Blue Eyes was unhappy.

The next day fewer females again left the caves, and fewer the day after that, until the mating was done. That left many males still unmated, and these walked quickly from the valley. Stonebreaker wondered if they were happy that they had not danced for a mate. The day after that the males in the caves began to leave, and that night Longheads hunted on the plains, near the tree the men slept in.

The next morning Blue Eyes said, "The Longheads hunt again. They will find us here in the dark, but no animals live in the hills, and no animals hunt in the hills."

"Yes," Catkiller said, and Stonebreaker shivered. He thought he knew what Blue Eyes was going to say, and he had never slept on the ground one night of his life.

"We will sleep in the hills," Blue Eyes said.

That day more Longhead males left the valley, and only a few females and young came out of the caves. Well before sunset the men went to the plains to eat and drink, and then they climbed a hill higher than the one they watched the valley from, and tried to sleep.

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It was quiet in the hills, but for a small wind and the sound the soft land made whenever Stonebreaker moved. The land was strange against his skin, and formed itself closely to his body. He itched. There was not enough air around him. He did not like the sound the land made when he moved. He waited and hoped for sleep, but his eyes often came open and he watched the light in the sky. Sometime before dawn he slept.

The next day a few more males left the valley, and a few left every day for several days after that. Each day Blue Eyes and Stonebreaker and Catkiller came to watch, and each night they slept in the hills. It was easier after the first night, though Stonebreaker was tired of Longheads, and he missed the forest. Blue Eyes said nothing about the forest. He talked about killing the females, and at night he watched the light in the sky and asked questions Stonebreaker could not answer. Stonebreaker thought of the forest much of the time.

One morning they went to the plains for fruit and saw giants by the stream, and with the giants was Longhair. The giants were walking upstream toward the Longhead valley and did not feed.

Longhair saw them and came running over, happy. As he ran he made noises to the giants, and they stopped and watched the men, but none raised a rock in threat.

Longhair carried an armload of strange brown things that Stonebreaker thought were large nuts. He said, "Good, good, good," and gave each man one of the nuts.

Blue Eyes said, "You are good to us, Longhair."

"Happy. See you."

"Do the big chewers know there are Longheads there?" Blue Eyes said, and he pointed toward the valley.

"Yes. Not go."

"What will they do?" Blue Eyes said.

"Other place. Show great thing. "You come. Great thing."

"What?" Blue Eyes said.

"You come. Great thing."

Stonebreaker looked at the thing Longhair had given him. He tried to bite it and found it was as hard as dry wood.

"Will a giant eat this?" Stonebreaker said.

"Good. Eat good. You come. Show great thing."

Blue Eyes said to Catkiller, "Will we see this great thing?"

"It is for you to say. We have seen the Longheads many days."

"We will go with you," Blue Eyes said to Longhair.

"Good, good, good," Longhair said, and he took them to where the giants waited. The giants carried the same kind of nuts as Longhair. Those giants that did not carry a rock in one hand carried two armloads of the nuts. The giants stared at the men, and their eyes frightened Stonebreaker, but then Longhair made noises at them and pointed at the men, and the giants looked away.

The giants went up the stream to a

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place where the water was shallow, and they crossed to the north bank. They went upstream again, to a line of grass that was still deep green even though everywhere else on the plains the grass was drying and yellowing. The green line led north to the hills, and the giants walked along it. Soon the ground was soft and damp, and then the hills were around them and they were in a small valley.

White mist rose from cracks in the hills, and water trickled out of caves. The valley floor grew thick green grass, and strange plants with pulpy limbs. The giants walked through the valley and went into a cave. Though Longhair went with them, Blue Eyes stopped outside.

The hillside was wet. Mist came from the cave, and out of a crack in the hill above it.

"The ground is warm," Stonebreaker said.

"Is there fire?" Blue Eyes said. "The mountain that burns is beyond these hills."

"This is mist," Stonebreaker said. "It is not smoke."

Longhair came out of the cave and said, "Come. Show great thing," and they went cautiously into the cave with him.

Light came through the crack in the top. The ground grew warmer as they walked. Near the end of the cave was a pool of water, and the giants were gathered around it. The water bubbled, and mist rose from it. Stonebreaker saw that the giants had thrown the nuts they carried into the pool, and the nuts bobbed and danced in the bubbles.

Water ran into the pool from the back of the cave. Stonebreaker went to look closer at the place where it came from, and when the mist rising there blew past his chest and face, the pain of the heat made him cry out and jump back.

"What?" Blue Eyes said.

"Hot," Stonebreaker said, and he stood under the draft from the crack in the roof and let it cool him.

Blue Eyes went cautiously to look at the mist hissing out of the rock behind the pool. He rushed the butt of his spear into a hole in the rock. He worked a few stones loose, and they fell into the pool. Water splashed on him, and he yelped and rubbed his skin where the water had hit.

Stonebreaker saw that the butt of Blue Eyes' spear was smoking and had been blackened by the heat. He showed it to Blue Eyes.

"The rocks are like fire," Blue Eyes said, and he watched the spear butt until the smoke died.

There was excitement among the giants, and the men turned to look at them. The giants were taking the nuts from the pool. Each giant had kept one nut from its armload and was now using it to pull others from the water and flip them about until they cooled. Longhair brought a nut that was ready to eat to Blue Eyes, who tasted it and said, "Good." Longhair hissed, and gave some of the nut to Catkiller and Stonebreaker. The nut was easy to chew now, and it *was* good, with a

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taste almost like meat.

"It is a great thing," Stonebreaker said, and Longhair said, "Eat. Take more."

They ate all that Longhair gave them. When the water was empty the giants threw in the nuts they had used as tools. When these were ready to eat Longhair gathered them to one side of the pool with his spear and flipped them out with the point.

The giants left the cave after all the food was gone, and Longhair said to Blue Eyes, "You come. Big chewers good."

"No. We fight the Longheads."

"Big chewers good."

"They are good," Blue Eyes said, "and we will see you another time."

Longhair's face was sad. He touched each of them, and then he ran after the giants.

Blue Eyes put the point of his spear into the pool near the place the mist came from, and he dragged out a stone. Catkiller and Stonebreaker moved to help him, but he said, "Go, and get grass and wood."

"What?" Stonebreaker said, suddenly afraid.

"Get grass. If the stones make fire, we will burn the Longheads."

The grass they brought from the valley would not burn, and they could find no trees to get wood from, only the soft plants. Blue Eyes sent them to the plains, and when they came back with yellow grass and dead wood, Blue Eyes had several stones in a pile on the cave floor. He took some of the grass and threw it on the stones, and the grass began to smoke.

Stonebreaker watched the grass and hoped that it would not burn, but Blue Eyes pressed it down against the rocks with a stick and flame burst up. Blue Eyes showed his teeth, and he threw more grass on the stones, and then some wood.

"We will kill the Longheads," Blue Eyes said. Stonebreaker looked at the fire. It frightened him, but he could not look away. Blue Eyes built it higher, and used up all the grass and wood, and only when the last spark had died did he leave the cave.

V

It was Blue Eyes' plan to set fire to the grass between the Longhead caves and the lake. The fire would spread to the grass and bushes on the slopes below the caves and then to the caves themselves, where there would be nests to burn. "The Longhead the Stonebreaker killed had a nest of grass," Blue Eyes said, "and there will be nests in the caves."

Stonebreaker saw that Catkiller did not like the plan, and neither did he, for he feared greatly to run into the Longhead valley, even with fire in his hand—for he feared the fire as much as he feared the Longheads.

Catkiller said, "If there are no nests in the caves?"

"Will the Longheads sleep on rocks?" Blue Eyes said. "There are nests."

"Will the fire reach them?" Catkiller said. "The grass on the slopes is thin."

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"There are bushes, and the bones the Longheads throw."

"Will bones burn?" Catkiller said.

"Yes."

Stonebreaker wondered how Blue Eyes could know that bones would burn, and then he thought that Blue Eyes did not know, any more than he or Catkiller knew. But Stonebreaker did not dare to challenge him. Catkiller said, "We are not many. The mating season is gone, and the males are on the plains. If all of us live, the way to the forest will be hard. If one man dies, or two, will any of us live?"

"We will not die," Blue Eyes said.

"Who can say?" Catkiller said. "If you die, will the Stonebreaker and I live?"

Blue Eyes said, "We have not come far east. If I am dead, you will live. Two days will take you to the forest. If you sleep the night in the northern hills, you will not see the Longheads."

"We have come far north," Catkiller said. "There are not many of us."

"We will not die," Blue Eyes said. "The Longheads will die."

"The things you see in front of us are strange," Catkiller said. "No hunter makes his weapons from fire."

"I see death in front of us," Blue Eyes said. "The death of men, or the death of Longheads. Will you leave me? I will set the fire myself."

"Has any man ever seen such things?" Catkiller said. "Nothing is like it was before the Stonebreaker killed a Longhead.

"I will stay."

On the day the last male left the Longhead caves, the females came down to the lake at sunset. There were many more of them than Stonebreaker had thought there would be, and most of them had young. The females waded in the lake, and their young ran in the shallows, and Stonebreaker could see no Longheads left in the caves.

The next morning, when the Longheads were back in their caves, Blue Eyes and Catkiller and Stonebreaker went to the fire cave. As they walked they gathered dry wood and grass. The grass, and some of the wood, they took with them to the cave. The rest of the wood they left in small piles along the way to the Longhead valley.

In the fire cave they pulled many stones from the place the hot mist came from and piled them up and threw grass on them, and soon had a fire. Blue Eyes threw twigs, and then larger sticks, on the fire until only three pieces of wood were left. Each man held one of these pieces on the fire, and when the wood was burning strongly Blue Eyes led them from the cave.

Stonebreaker carried his fire fearfully, and long before they reached the first pile of wood he had let it go out. Blue Eyes was angry, and when Stonebreaker had new fire he said, "Do not fear it."

"No," Stonebreaker said, and before they reached the next pile of wood he had let the new fire also go out. It was not until they were on their

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way to the last pile, the one that waited at the mouth of the Longhead valley, that he did not let his fire go out. Blue Eyes was pleased, and Stonebreaker was proud of himself.

They thrust their fire into the last pile of wood, and when it was burning they each took a new fire from it and ran on to the valley. The way into the valley was wide enough for the stream and the Longhead trail and no more. The smell of Longhead was strong. Stonebreaker's fear of fire was lost in his fear of Longheads. It was near the middle of the day, yet Stonebreaker worried that some of the Longheads would be awake and see them.

They came out of the hills. Stonebreaker looked across the valley, and there were no Longheads by the lake, and nothing moved in the caves.

They ran along the stream toward the caves. The wind was behind them, and now Stonebreaker worried that their scent and the smell of fire would carry to the caves. He thought this worried Blue Eyes too, because Blue Eyes ran faster and Stonebreaker had trouble keeping his fire from going out.

They stopped once and watched the caves. There was nothing to see but darkness, and they ran on. When they stopped again, there were Longheads in the mouth of one cave, and Stonebreaker felt their eyes on him.

"They smell the fire," Catkiller said.

"Yes," Blue Eyes said, "and we are not to the place I wanted. We will do it here."

He pointed the way they had been running and said to Catkiller, "Go that way. When you see my fire, set your fire."

"Yes," Catkiller said, and he left.

Blue Eyes pointed toward the grass between the caves and the mouth of the valley and said, "That way, and when you see Catkiller's fire, set your fire."

Stonebreaker ran. At first he tried to crouch below the grass, but his fire threatened to catch on the dry stalks. He stood up and ran, and watched the Longheads. There were many awake now. They did not come out of the caves to attack the men, though, and Stonebreaker thought they were frightened of the smell of fire.

Then he heard their voices. He looked around and saw smoke rising before the caves. Blue Eyes had set his fire, and soon Stonebreaker could hear it over the noise of the Longheads. He waited. The wind blew smoke toward the caves, and some Longheads started down the slope. Stonebreaker watched them, and then the fire, and he waited, his legs aching to run, for Catkiller's fire.

There was more smoke, and it seemed to be all around him. Had the wind changed? The crackling of the fire was closer. He tried, but he could not tell how many fires were burning, but then he saw Longheads running toward him, looking for a way past Blue Eyes' fire, and he threw his fire into the grass, and started back toward the stream.

The grass caught, and smoke rose.

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Stonebreaker heard cries from the Longheads. He stopped and watched his fire spread, and he showed his teeth. He felt good. He ran on, and smoke was everywhere. He looked back and saw flames taller than a giant, and he was not frightened, but so excited that he was shouting. These flames were his and Blue Eyes' and Catkiller's! He shouted at the fury of smoke and flame, and ran on, looking for the other men.

He found Catkiller at the stream. Catkiller's hair and beard had been burned in places. His arms had been touched by the fire, and he held them in the stream to cool them. His eyes watered. He was out of breath.

"Fire is fast," he said.

"Where is Blue Eyes?"

Catkiller pointed toward the fire. Then he put his head in the stream and threw water up on his shoulders and back. When he stood up the water ran down his body and he rubbed it over his skin.

Small animals came out of the grass. Some passed close to the men and gathered beside them on the stream bank. Others jumped into the stream. Some of these got to the other side, and some were carried away with the current. The fire burned closer, and Stonebreaker's excitement was overtaken by fear. Where was Blue Eyes?

The wind blew around Stonebreaker. It came hot from the flames and carried ashes and sparks. Soon fire was leaping up on the other side of the stream. All the valley was going to burn. Where was Blue Eyes?

"If he is dead?" Stonebreaker said.

Catkiller looked around at the fury they had started. His face was unhappy, but not afraid. "If he is dead, he has killed himself," he said. "We will wait. If the fire comes we will go in the water."

But Blue Eyes came before the fire did. The fire had touched him, and what was left of his hair and beard still smoked, though he beat at it with one hand. In the other hand he carried his spear, and the head of a Longhead. He stuck his spear in the ground and swung the head by its hair for them to see. He said, "It found a way past the fire, and I killed it."

"A great thing," Stonebreaker said, and he saw how happy Blue Eyes was. Catkiller did not look at the trophy. He said, "Will we leave?"

"No. The fire is close. We will go into the water," Blue Eyes said, and he stuck his trophy on the point of his spear and walked into the stream. Stonebreaker and Catkiller went after him.

The fire on the far side of the stream had reached the bank, and the air grew foul. Smoke and ash burned Stonebreaker's eyes. Then fire reached the bank the men had left, and the stream was filled with small animals. Some tried to climb on the heads of the men, who knocked them away and watched them float down the stream.

With fire all around, the hot wind carried no life. The men gasped in it, and Stonebreaker's throat ached. Only

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when the fire on the far bank burned out did a fresh wind blow along the stream. It fed the fire on the near bank and lifted the smoke from the stream. Stonebreaker breathed again without pain.

The wind blew the flames high and the fire on the near bank burned out. They walked from the stream up the blackened bank and looked across the valley. Fire burned to the east and south, and smoke was everywhere.

They waited while the wind blew the smoke east, and then they could see the Longhead caves. Fresh smoke came out of them. The fire had reached the caves, though Stonebreaker could not tell if the bones below them had burned.

"We have killed the Longheads," Blue Eyes said.

"Not all," Catkiller said. "Look."

There were Longheads on the bank upstream. As the smoke cleared, more of them came in sight along the lake shore. Altogether there were not many, and they moved about like the frightened animals that had gathered with the men at the stream. Some came near, and Blue Eyes pulled his spear from his trophy and the men faced the Longheads, ready to fight.

The Longheads stopped when they saw the men. They stared, but their eyes were empty of any threat.

"They are animals," Stonebreaker said. "The fire has taken the fight from them."

"The fight will come back to them," Catkiller said. "Will we leave?"

"Wait," Blue Eyes said. The Longheads had not moved. Blue Eyes picked up his trophy by the hair and threw it at them. It landed at their feet and they looked at it and backed away. Blue Eyes hissed. He said, "We will come back with the hunters and we will kill them all."

The Longheads backed farther away, and Blue Eyes followed them and got his trophy. The Longheads turned and ran and were lost among others upstream.

"This is a great thing," Blue Eyes said, and he looked around the valley. Where the fire had passed the ground was black, and where the fire still burned smoke hid the hills and the sky.

"A great thing," Blue Eyes said, and he started downstream toward the plains. Stonebreaker looked once at the Longheads, then started after Blue Eyes, happy that he had seen the last of the fire.

They went as Blue Eyes had said to Catkiller. They walked the plains the rest of that day, and slept in the hills that night. They smelled Longhead on the plains, but they did not follow the scent. The only danger they faced was from the great cats, but there were feather trees for safety. The next day they came to the end of the hills.

They hunted, and ate, and slept in the hills, and the next day they started west with the first light. They walked fast across the plains, though Stonebreaker thought the day went faster, and they saw nothing of the forest. Stonebreaker began to worry as the

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sun passed the top of the sky. Blue Eyes was happy. He looked at the animals on the plains and he said, "When the Longheads are all dead, we will come and live on the plains, and sleep in the big trees. Other tribes can live in the forest."

"What tribe lives here in the forest?" Catkiller said.

"Gti live at the North Lake," Blue Eyes said. "I was with Shortlegs once at the North Lake, and I know them."

"If we are north of the North Lake?" Catkiller said.

"We will go south on the plains and find the Gti."

They saw the dark line of the forest on the horizon well before dark. Blue Eyes stopped. He said, "We will take meat to the Gti."

They killed one of the horned animals of the plains, and cut it up. They went on, and Catkiller and Stonebreaker carried the meat, and Blue Eyes walked behind them and watched for danger.

The forest was close. Stonebreaker's worry turned to excitement. They had great stories to tell to the Gti, and anyone else they met on the way home. Stonebreaker thought of the North Lake, and hoped he would see it. Old men said that it was so big that a man could not see across it, that a man would take many days to walk around it. He thought more about the North Lake, and then he thought of the things he had already seen since he had gone with Blue Eyes to hunt the Longheads. When he thought of the giants, he thought of Longhair, and missed him, though he knew that Longhair was happy with the giants. The food Longhair got from chewers was no longer needed by the tribe, but he had found a new place with the giants.

Giants. Longheads. Fire. They had much to tell, and Stonebreaker was happy.

There were men in the forest. Blue Eyes shouted words at them that Stonebreaker did not know. The men answered, and Blue Eyes said, "They are Gti."

Then Stonebreaker smelled the forest. He showed his teeth, and looked at Blue Eyes and saw that Blue Eyes too smelled home and was happy.

"We have done many great things," Blue Eyes said. "Men will talk about them for many seasons," and Stonebreaker felt a chill run up his back, as when Shortlegs had praised him for killing the first Longhead.

"We have done many great things," Blue Eyes said again, "and we will do many more."

The shade of the first trees crossed Stonebreaker's face. Deeper in the forest, where the trees were thick, the Gti waited, and Blue Eyes held his spear straight up in greeting. The Gti stared at Blue Eyes, and Stonebreaker knew they were looking at the burns on his skin, and the places where his hair was gone, and the skull he carried that looked like a man's. Then they looked at the meat that Stonebreaker and Catkiller carried, and they raised their spears in welcome. ■

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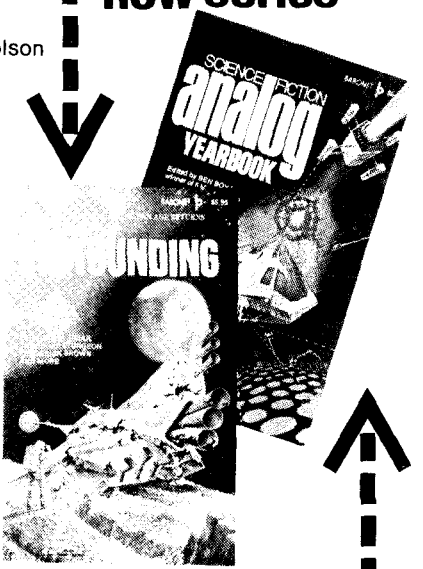

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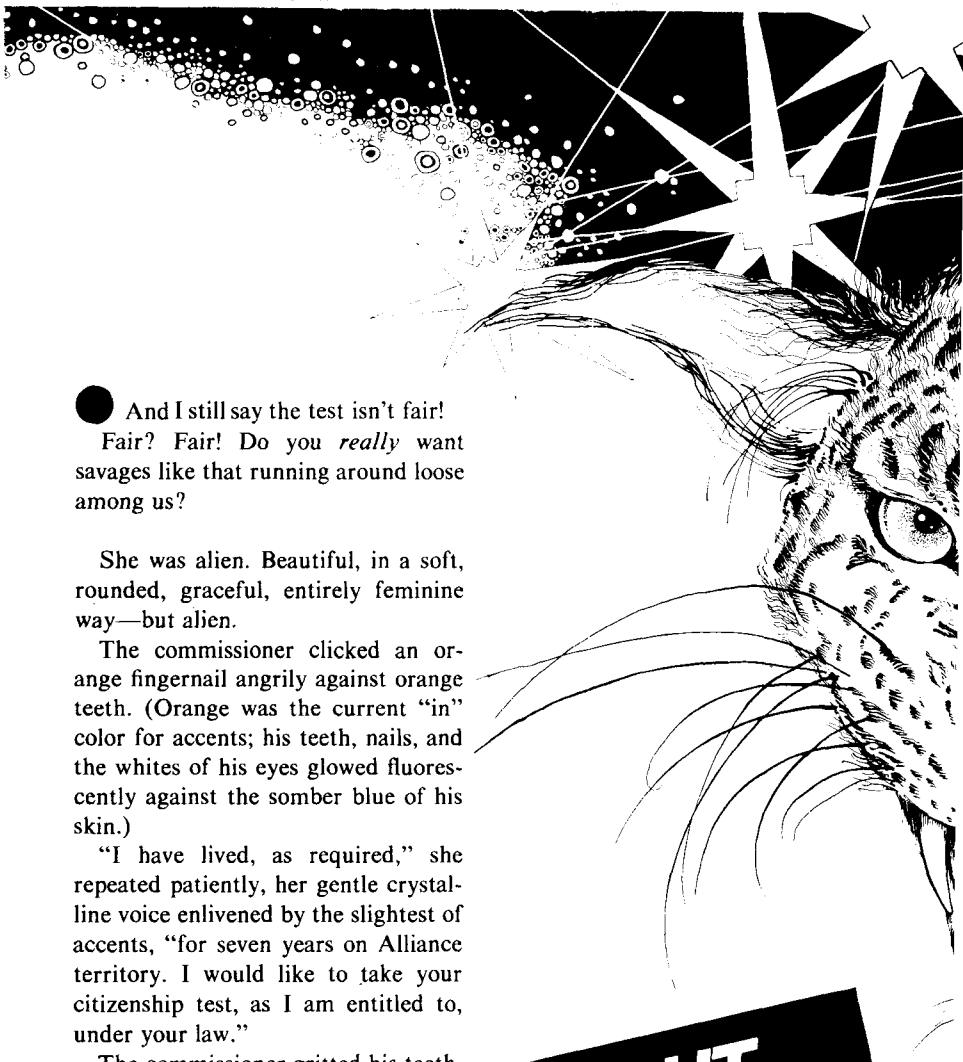

RIGHT OF PASSAGE

You can't cheat an honest man—or alien!

JAYGE CARR

● And I still say the test isn't fair!

Fair? Fair! Do you *really* want savages like that running around loose among us?

She was alien. Beautiful, in a soft, rounded, graceful, entirely feminine way—but alien.

The commissioner clicked an orange fingernail angrily against orange teeth. (Orange was the current "in" color for accents; his teeth, nails, and the whites of his eyes glowed fluorescently against the somber blue of his skin.)

"I have lived, as required," she repeated patiently, her gentle crystalline voice enlivened by the slightest of accents, "for seven years on Alliance territory. I would like to take your citizenship test, as I am entitled to, under your law."

The commissioner gritted his teeth. Even a third assistant attache knew better than to break the unwritten law: no alien to be allowed to serve, in whatever capacity, at an embassy or consulate (and thus legally on Alliance territory) for more than three years. And never, ever!, hire a repeater!

But because she looked like a native of this world, some idiot—and when he found out who!!—had hired her on without checking more than the local

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memory banks to see if she had been hired previously. (Well, he had fixed *that* loophole. A new ruling had been issued—all native hires to be checked out through the master banks at Alliance Central, not just on whatever worlds they happened to be hired on.)

And in between her two stints, a rich, old fool, rich enough to pay the immense alien-overage fee for carting her about with him on Alliance commercial ships. (Businesses knew who issued trading licenses—but what could you do about rich eccentrics?)

So now—his problem.

"But why do you want to be an Alliance citizen, eh," he inserted a fatherly chuckle into his voice. "You'll have to give up your own citizenship, did you realize that? You aren't allowed dual citizenship, you see—"

The umber lemuroid eyes widened. "This I must do, also. I had not understood . . ."

"Why, yes," he pressed his advantage. "We don't allow it, and even if we did, most of the native—I mean, associate worlds wouldn't. They have their pride, too, you know. Is that really what you want to do, m'dear—give up your birthright—forever and ever . . ." He let his voice trail off, thinking smugly that he had won.

The eight-pointed stars that were her pupils waxed and waned, and the filmy plumes that covered her body drew in so tightly that she looked like she was wearing a bodysuit of softest velvet, shading in color from dull gold to palest beige. The commissioner involuntarily licked his lips. Maybe that old man wasn't so old, he thought; and I understand that young fool. . . .

"But—but," she said softly, "you are the best. I would be becoming the best. I would have the freedom of your ships, your worlds, I would—"

His scowl cut her off. "And your children, too." His voice was as soft as hers.

"But of course. Is that not your law?" she asked anxiously.

"That is the law," he said. "But only if both parents are Alliance citizens." (Which took care of the bleeding-heart weak-sisters who might decide that half a native citizen [thanks to modern medicine] was better than none. You couldn't gain citizenship by marriage any more—but if the native herself was a citizen . . .)

"So-oooo?" If she had had cat's whiskers, he thought angrily, she would be licking them.

"I see," he snorted, and he did see. "Do you really think giving you the name will make you a *human being*?!?"

"Alliance is the best," she repeated. "I would be the best."

He snorted, loudly. "There are certain qualifying tests you have to pass first. They are—some of them—quite difficult."

The filmy plumes about her face raised and lowered, the effect of a nod. "I understand. I have studied. Very hard, many long years, I have studied."

"I'll *bet*! Well, if I can't change your mind, you shall have your rights,

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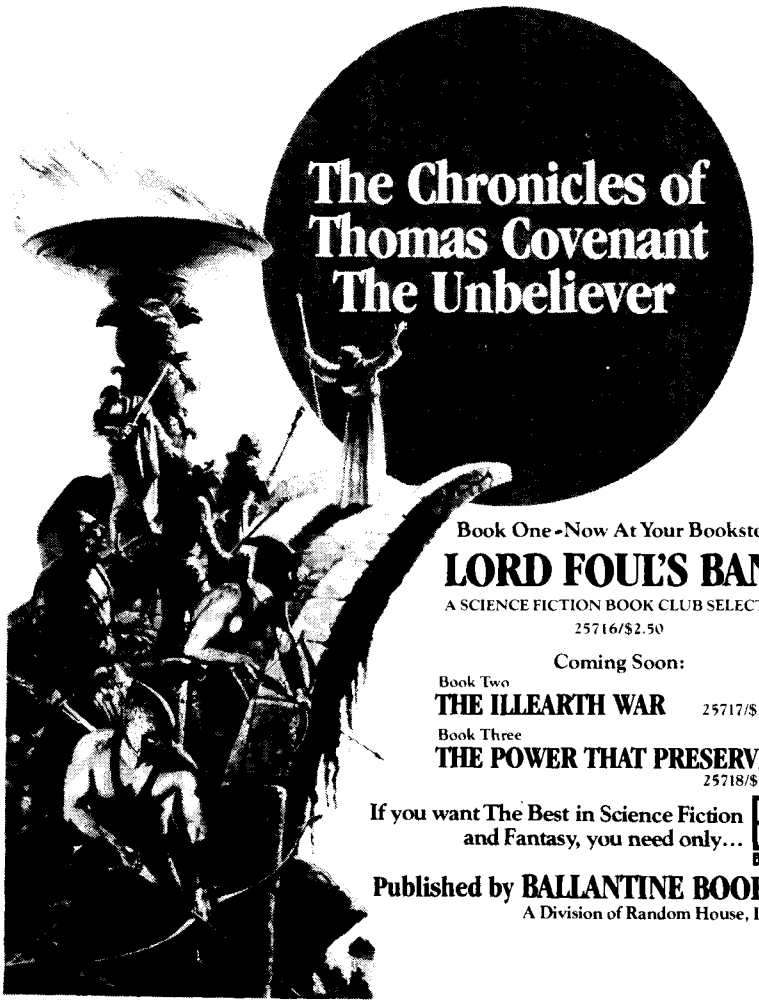

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under the law. I'll order the tests set up for you. Comm my secretary tomorrow, he'll have further instructions for you then."

The alien rose. "I thank you."

The commissioner smiled.

Noel bar Eliezar-Singh was waiting for her at the end of the corridor. "What did the old plasma-spitter say?"

"There are to be tests," she was calm. "I will take them."

"Oh, Lilith, no," Noel groaned. "Don't you see? Don't you understand? He'll rig them, you'll never pass them. He'll fix things so that—"

"But by your law there must be tests, must there not? And they are prescribed by that law, not so? That they must be difficult, that is only fair, only right. The Alliance is best, not so, and wants only the best. But that they be fair tests, that they can be passed, if one is intelligent and studies hard, as I have studied—not so?"

"No, not so! Oh, Lilith, there's never been a law yet, fair or not, that a clever politician couldn't wiggle around. You've got to get him to skip the tests. I'll go talk to him again, I'll—"

The eight-pointed stars almost disappeared in the impossibly widened eyes. "*You* went to talk to the commissioner?"

He flushed. "Yes, last night. My department's lines cross his, after all, and I—"

"You would have him break your own law—for *me*?"

"Not break, Lilith, not *break*. Just—ahhh—bend a bit. The law gives him the authority to omit the formal tests—if he feels they're unnecessary. I tried to talk him into—I mean—Lilith, it isn't fair! You and all the people like you—second class citizens on your own worlds even. While him and the likes of him stride about, lords of creation, trampling—"

Incredibly, she was amused. "But that is only right," she said, in the voice that was the distant chiming of fragile crystals in the wind. "Alliance is best. But best can become Alliance, so that is fair, not so?"

He only groaned.

The tests were tough, but passable. And though she looked as wilted as a blighted flower at the end of each session, she passed them.

The commissioner clicked his fingernails against his teeth (purple now, the newest in color) and wondered if he dared change just a couple of answers. She had passed by such a narrow margin, so if he just jiggered the results a *little* . . .

After much soul-searching, he resisted temptation.

But by not telling Noel and Lilith the results of the tests, he insured that there were no newshounds at the swearing-in. (He had Noel's measure, he did!)

Very private that swearing-in, just the commissioner, Lilith herself, Noel, and a cynical-eyed attache for the necessary second witness.

They went meticulously through

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the necessary formalities, Noel watching the two diplomats with gimlet-eyed intensity, just waiting for a flaw or an error. But there were none, and Noel finally relaxed against a free-form, as the commissioner stood facing Lilith, their bodies turned slightly sidewise so the recorderscreen could easily pick up both their figures.

"Just one last formality, and we'll be all through, m'dear," the commissioner chuckled jovially. "Now, Lilith—by the by, is that your full and complete name, m'dear—Lilith?"

Again the plumes rose and fell in the effect of a nod. "Is my name now. Other I had, not Alliance name. I have Alliance name now."

"Very good, very good. Well, then, Lilith, just raise the right hand, and put the other one on the Alliance seal here, and repeat after me. I, Lilith—"

"I, Lilith—"

He took her through it slowly, a phrase at a time, and when it was over, Noel picked her up and swung her jubilantly around. "Hey, Citizen Lilith, how does it feel to be a citizen?"

"But she isn't."

Startled, they both whirled to face him. "Wha-at," Noel's voice was a growl, "but she took the oath, before witnesses. You can't—"

"The oath was invalid." His smooth voice drowned Noel's sputtering protests. "Completely invalid. Which hand did she place on the shield, Mboya-Juarez?"

"The left, sir."

"And which should it have been?"

"The right, sir."

"Which piece of simple information she should have known. Every citizen should know that it must be the right hand on the shield when taking an oath."

"But you *told* her—" Noel spat the words out.

"I told her to raise *the right hand*—do you want to rerun the recording and check me? I told her to raise the right hand, the correct hand—and she raised the wrong hand, the incorrect hand. And the oath was invalid."

"Lilith," Noel asked, "did you know that it was supposed to be the right hand on the seal?"

"Yes, Noel. But when he told me to raise my right hand, I obeyed."

"That's just as disqualifying," the commissioner pointed out. "No one can be a citizen who can't understand plain standard. Call it a last little test, if you wish, one last qualification. And she failed it. But under the law, she can apply again in six months. And I'm sure, after six months further study—"

"Six months," Noel was fierce. "She's lost her embassy job—for taking too much time off—*for your tests*!"

"We're not ogres, m'boy. If she can't find suitable employment here, I'll have her shipped home, under a distressed citizen waiver."

"Distressed citizen—she gave up her citizenship, remember!"

"I said we weren't ogres—oath invalid, I'll take care of that other little matter. No need to worry, she'll retain her native citizenship."

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"So she goes home, like so much unwanted garbage. And will there be an embassy job waiting for her when she gets there?"

"I can't promise that, m'boy."

"No, I'll just bet you can't! And, of course, if she has to live off Alliance territory for the next six months until . . ."

The commissioner shrugged, spread his hands in the old denial-of-responsibility gesture, his face bland. The attache was younger, had less control. A smug smile flickered across his features.

Noel raised both hands, clenched into fists. "You rigged this, you—"

Lilith placed a hand on his wrist, gently, but under that light touch his arms sagged and his shoulders slumped.

"The test is over, Noel," said wind in crystal, "and I want—I very much want—to go home."

The commissioner nodded to himself, in relief. Smart little thing, for a native, and she'd handle her young firebrand. In his triumph, he could afford generosity. "I'll see to your passage, Lilith. And you won't have to pay for it, you'll have your severance pay, all of it, when you get home."

"I thank you." Though the eight-pointed stars were almost drowned in brown sorrow, and the fragile shoulders bent under failure, she managed a graceful, formal sway, an almost-curtsy.

"Chin up, Lilith," Noel straightened his shoulders and gave her a quick, angry hug. "If not you, then someday, someone, some ordinary person will get to be a citizen."

"I hope so, Noel. I sincerely hope and pray so!"

"Oh, now, m'boy, don't be a fool. You don't fling babes from kindergarten right into university, do you? Of course not! You watch them and help them, and pen them in—for their own good, of course!—and when the time is right you promote them into first grade. One step at a time, m'boy, one step at a time." But not my time!

"But the time will come, someday, someone will have to graduate!"

"Oh, yes, someday. The time will come." But not for a long, long, *long* time.

Lilith said almost the same thing, later, reporting to her associates. "The time will come, for them. But not, I'm afraid—soon."

"The youngling accepted you."

"Oh, yes. There are always exceptional individuals, in any species. He is what encourages me to hope."

"It seems unfair, that all suffer for the actions of a few."

"Their law reflects the will of the majority. The few were merely expressing the wishes of the many."

"And when do you recommend the next test?"

"No sooner than next generation. They must mature. At this stage, how damaging it would be to them, to realize that it is they who have been quarantined and maneuvered and watched over, many of the natives they look down on volunteers from a

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Jay K. Klein

Leigh Brackett Hamilton

7 December 1915—18 March 1978

If you asked me to identify my favorite Leigh Brackett story, I couldn't give you an answer. Nor could I tell you of any one piece of her work which has particularly influenced my own writing habits.

What I can say is that it was the Captain Future stories—a joint effort between Leigh and her husband, Ed Hamilton—which hooked me on science fiction in the first place. And from then on Leigh Brackett was a name that cropped up so often it became an elemental part of my reading environment.

I was already writing science fiction by the time I met Leigh in 1952, and I was instantly hooked on the lady herself. She was barely ten years older than I, a smallish woman with sturdy bones and a tendency to roundness. She was always full of life and of laughter—when she laughed, her shoulders shook in the most delightful way. A beautiful woman who loved two things with complete passion: Ed Hamilton, and science fiction.

She worked very seriously at her writing. She provided a link, a crossover point. She wrote good science fiction with real, human people. Through her example, we have all learned the value of strong characterization.

John Campbell once asked Leigh for a short story. She explained that it was very difficult for her to create the rich background she needed for a story in anything less than 30,000 words. He said, "A novelette, then?"

Her reply was given and accepted without rancor:

"Perhaps I will, John, but my characters use their hearts—not their slide rules."

RANDALL GARRETT

unity far beyond their own efforts. They are such children, still."

"Kindergarteners," said one who had been greatly amused by the commissioner's metaphor.

"Still, it seems unfair, to make all hinge on such a test. They, not realizing that it is their acceptance of you which forms the true test."

"I came closer than any of the rest of us would have. They stress physical appearance, the closer to themselves the better. In their eyes, I am both appealing and innocuous, and never a rival. In the end, theirs was the choice."

"And I still say the test isn't fair!"

"Fair? Fair! Do you *really* want savages like that running around loose among us?" ■

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Tony was feeling so happy and so proud that he thought his heart would burst with joy. At twenty-two, he was about to become a PhD in Synthetic Water Manufacturing, or a Water Doctor, as he would be familiarly, yet respectfully, addressed; and after graduation he would be transshipped to planet Earth for two years of post-graduate training.

"We're so very proud of you!" had chimed his mother some time before, all puffed up with delight at her son's achievement.

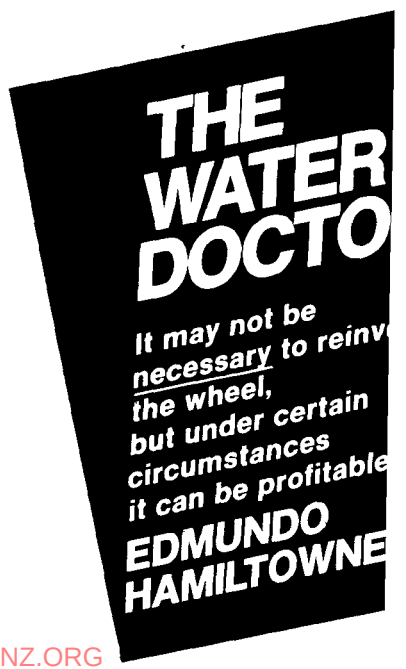
Sitting now alone in the first row of seats of the large windowless University amphitheater, Tony felt the warm glance of his parents and of his fiancée on the back of his neck. He looked right and left at the empty front rank of seats, his eyes shining, a smile of satisfaction glittering on his lips. He was alone there, for Tony had been the only one to graduate. All his other classmates had flunked long ago.

"Idiots!" Tony thought with a grimace. His classmates had doubted, had asked foolish questions; some of them had even had the gall of saying aloud that it was pointless to manufacture water! "Imagine!" thought Tony disgustedly, shaking his head, "to doubt of our usefulness, to cast off a life of ease and status and, above all, to spit their distrust in the faces of our hand-picked, Earth-trained Professors!"

And the Professors had been firm. All flotsam had been ruthlessly scummed away along the freshman year, till only Tony had remained. He had succeeded because he had been smart enough to remain quiet when he had to, to say the right thing at the right time, as on cue, and because of his tact and diplomacy with his seniors.

Tony had had doubts at the beginning, like everybody else, but had soon learned to respect—or to fear—the wisdom of his mentors. They had been on Earth. They had learned a lot there. They were right. And, besides, to doubt meant to be left out in the cold. So, with iron self-discipline, combined with what he thought was respect for his Professors, Tony soon taught himself to choke away every single shadow of a doubt.

"On Earth we have learned that water had to be synthetized with great care. We've seen that with our own eyes," Professors would say. And they were right, of course. Here, as on



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every properly developed planet, air and water manufacturers were the most sought-after and best paid of scientists. And it made sense. Earth had no atmosphere. Without it, there can be no air nor water and, without them, there can't be life. On the other hand, despite all the impressive scientific advances made on Earth, to manufacture synthetic water in large enough amounts still remained a highly complicated and exacting job, only to be done by University-trained personnel. "And look at how handsomely they reward me!" Tony thought with pride, his hands sweating with anticipation, "I'm the only one to graduate, I'll train on Earth, and then I'll live well and happy here, respected as a scientist, well paid, and without a care in the Universe except to manufacture synthetic water."

The amphitheater was packed with people who had come to witness this solemn event. The hubbub died down when the Dean went up to the dais.

"Ladies and gentlemen . . ." the Dean started. Tony leaped back into his reverie. The whole ceremony, including the Dean's speech, had been carefully rehearsed the day before. Everything, down to the moment when, after the speech, the Dean would usher him to the transshipper which had been placed immediately behind the dais for the occasion. Yesterday Tony had only been shown the transshipper, a cabin large enough to hold him standing.

"Tomorrow will be the real thing, Tony," the Dean had said when he had opened the transshipper's curtain, bathing him with a wary smile. "Please suffer me to remind you again to be careful on Earth. You know how much we depend on their grants for our work."

Above the drone of the Dean's voice, Tony heard distant sounds of howling, of thunder, of pelting, as they filtered through the thick amphitheater's walls, but didn't listen to them, after his four years of iron self-discipline. Tony's only concern was that he was now sitting triumphantly there, alone in the front row of seats, important in his black toga, a rosy lifetime of status and success unfolding in front of him.

"Today is the day!" he thought with joyful anticipation, as a salvo of applause closed the Dean's speech.

"And now, Anthony Lund," the Dean said in a strong voice, "my colleague, my friend, my fellow scientist, come and receive your Diploma."

Tony rose as the University choir burst into Händel's Halleluja, which was traditionally sung at such momentous occasions. Tony went to the dais afloat a sea of applause. "Bravo!" they would shout, once and again, from here and there.

Once on the dais, Tony turned to the public to bow. His mother, father, and fiancée were on their feet, crying with happiness and pride, while applauding and shouting "Bravo!" Tony frowned slightly, for he noticed a dash of anxiety and fear in his fiancée's eyes.

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"Will you come back to me after your two years on Earth, now that you are a Water Doctor?" she had asked him the night before, immediately after making farewell love. "Will you still love me, now that you are so important?"

"Of course I'll come back to you!" Tony had answered, embracing her. "I love you with all my heart!" She had clung to him, sobbing, as Tony had vainly attempted to comfort her, while feeling wonderful on account of her awareness of his new status and importance.

Once more the muted, distant sound of thunder, of howling, of pelting. Once more, Tony paid no attention to it. He was a synthetic water manufacturer now. The Dean opened the transshipper's curtain and Tony stepped inside. The cabin became dark when the curtain fell over its entrance again.

The sounds of applause; of distant thunder, pelting, howling; of the "Bravos!", of the choir's voices, all ceased suddenly.

"Welcome to Earth!" said the tall, loose-jointed man who opened the transshipper's curtain. "I'm Dan. We've received excellent references about you."

Dan was deeply tanned, a fact that astounded Tony. Dan ushered Tony to the next room, and Tony gaped at the water-manufacturing complex. It was of colossal proportions.

"It produces twenty thousand liters of synthetic water a day," said Dan, smiling at Tony's astonishment, while busily working on the console.

"Twenty thousand liters!" echoed Tony, awed.

For the next two years, Tony studied and worked conscientiously. He also learned to live on bone-dry planet Earth. The merciless sun tanned him rapidly. A sun that was shining in a dark sky, for Earth had shed its air and water, a long time before.

Tony visited several human groups, located in areas as distant as where formerly had stood Canada and Argentina, the bottom of the Atlantic Ocean and Siberia, Australia and Greenland. These communities lived in reinforced hermetic plastic domes. Around them, the deeply pitted ground, silently swarming with robots and machinery, clearly showed the frantic, yet orderly efforts to gather ore from which crystallized water, oxygen, hydrogen and other vital materials could be obtained. Inside, its occupants were kept busy working at the air and water manufacturing facilities, at the various labs, and at the areas where they tenderly grew the plant life that fed them and that renewed the air they breathed.

After one particularly strenuous day of training and working, Dan and Tony were resting, leaning against the trunk of a rachitic tree inside one of the domes. Both were feeling relaxed and contented.

"I wanted to ask you," said Dan idly, "what's the population of your home planet?"

"Oh, somewhere around ten million

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or so, I guess," answered Tony truthfully, caught unawares. He was feeling homesick with the smell of damp earth and vegetation.

"But how do you manage?" blurted Dan, stupefied, "here we can't let it rise above one million. Are your domes that large?"

Tony felt panic ball up in the pit of his stomach. "Well," he answered hastily, "we have a natural atmosphere of sorts, but the government is starting to build domes such as you have here, with synthetic air and water facilities."

"I see," said Dan frowning, not seeing anything at all. A loudspeaker called him to the water manufacturing complex. "Oh, well . . ." he said, shrugging and getting up, "it's safer like this, anyway."

"It certainly is," agreed Tony, relieved.

Expertly coached by Dan, Tony learned to respect and to admire that sturdy group of people who so intelligently had faced and solved their problem of survival, their coolness and efficiency, their resilience and adaptability, and the generosity with which they handled grants and help so that on other planets people could solve the same kind of problems. "How right were my Professors back home!" Tony found himself thinking often. The free-and-easy camaraderie he received from his fellow Water Doctors; the deference he was granted in all domes; his respect, gratitude and admiration both for his Professors and these people; plus the glorious and easy future that awaited him, made Tony haughty and supercilious toward those engaged in other activities. After one year on Earth, he was offered a grant to further his work after returning home, and Tony's happiness became complete.

Tony's two years of postgraduate training flew busily by too soon. "Time to transship you back to your home planet," said Dan, on Tony's last day on Earth. Dan was smiling sadly. "I shall miss you, Tony," he added, as Tony entered the transshipper, happy to be returning home with that coveted grant and looking forward to the wonderful career waiting for him there; and yet sad and sorry at leaving Dan and these wonderful people.

"Welcome home!" said his Dean as he opened the transshipper's curtain. Tony walked out blinking and squinting his eyes. Despite the large window, there was a gray twilight in that University classroom, due to the constantly overcast skies. After adjusting his vision, Tony looked at his Dean, and was striken by his pallor.

"You look tanned, Tony," said the Dean. "Plenty of sunlight on Earth, as I recall."

"Yes, sir," answered Tony, smiling his usually guarded smile. They were both talking loudly in order to carry their voices over the vicious howling of the wind and the noisy pelting outside the windowpanes. "Has my synthetic water manufacturing complex arrived safely?"

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"Yes, it has, Tony. It was transshipped piecemeal from Earth, and has been already assembled for you at your new lab. I hear you've obtained a grant," said the Dean, as a flash of lightning outlined them, and everything else in the room, in a livid bluish-white.

Tony's answer got lost in a terrific crash of thunder that shook the University building. Neither of them flinched, although both their ears remained ringing afterwards, and the odor of ozone filled the air.

"Could I walk with you to your new synthetic water manufacturing lab?" asked the Dean, solicitous.

"It's only a block away. Please don't bother, sir," Tony excused himself. During the past two years, Tony had been dreaming of the moment when he would enter his own large, fully equipped synthetic water manufacturing lab; and that was a thrill he didn't want to share with anybody, not even with his Dean. Foretasting the beginning of his usefulness and of his success, Tony absentmindedly put on his raincoat and galoshes before going out.

It was raining so copiously that Tony could only find his way by following the wall of the University building. In seconds, he was soaked to the skin, but four years of iron self-discipline, what he had seen and admired on Earth, his juicy grant and the rosy promise of his wonderful future, made him disregard that, too. ■

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FACT AND FICTION:
During the last decade, there has been a rather staggering amount of science fiction published—hundreds of millions of words. But what I find more surprising is the amount of material that has been written *about* science fiction. Most of that, in my judgment, has been pretty bad; but here and there, I have found books by writers or researchers who knew and understood the field well enough to produce material of value.

Much of the most valuable material about the field has been contributed by the fans. This has been taken for granted by many readers, but it should not be. In most other fields where there are fans, little of any useful material has been contributed by them. Scholarly works have usually been produced by scholars, and adulatory or fannish works by fans. In science fiction, the works by those who consider themselves scholars have too often not stood critical analysis.

(Of course, there's a complicating situation here. Men like James Gunn are qualified technically as scholars but may also be readers, fans and writers.)

One of the first really valuable pieces of bibliographic research in the field was Donald B. Day's *Index*, which came out in 1952—with the initial work appearing in a fanzine. This was eventually followed by indices prepared by the MIT and later NESFA fan groups. No real study of science fiction could be made now, it seems, without reference to these. W. B. Cole prepared a *Checklist of Anthologies;* that is still valuable, though sadly out of date and much in need of following up. There were a number of books of history and biography by Sam Moskowitz—and however many cracks have been made by critics about inaccuracies in some of them, there is nothing to replace them as reference material. Harry Warner and Sam Moskowitz gave us histories of early fandom, and they present about the only chance for today's reader to gain some understanding of those days.

All of which leads me to **The Encyclopedia of Science Fiction and Fantasy,** compiled by Donald H. Tuck (Advent: Publishers, Inc., P. O. Box A3228, Chicago, Illinois 60690). This comes in two volumes at $25 per volume; it's expensive—but I think it's well worth the price. And after suffering for four years with only the A-L volume, I'm delighted that the M-Z volume is now also available.

Donald Tuck seems the least likely man in the world to have acquired all the information about the huge number of books of science fiction that is compiled. He lives in Tasmania, Australia—about as far from the source of many of the books as a man can be.

The *Encyclopedia* lists every writer (or certainly almost every one) of science fiction—with pen names cross-indexed—and gives a short biog-

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raphy. This is followed by a listing of the writer's works that have appeared as books, together with the various printings and translations; alternate titles are listed, and dates of publication. In the case of collections, the stories included are listed. There is usually some short summary of the story. (The material covers all this through 1968; supplementary work will cover later years.) There's also an alphabetical listing by title of all books.

It's obviously an invaluable reference work which every library should have, and which should be at the hand of anyone doing research on science fiction. I'd recommend that any school teaching regular courses of science fiction acquire it; and my publisher was delighted to order the set for the office.

It's also a very useful reference for any reader who tries to get the maximum pleasure out of his reading. With it, I've managed to locate books I didn't know were in paperback editions; and in several cases, I've discovered books by favorite writers that I didn't even know existed. I've learned quite a bit about some of those writers from the biographical entries. And I've even enjoyed reading through the volumes at times.

There's to be a third volume covering magazines and other information. However, if you can use a really good reference book, get the first two volumes now.

The Visual Encyclopedia of Science Fiction, edited by Brian Ash (Harmony Books, 352 pp., $17.95) is a professionally-produced reference volume, though many of the articles were provided by fans, mostly British. It's an extremely attractive volume, copiously illustrated in color and black-and-white. And for such a book, the price is quite reasonable.

There's a Program chart, listing appearance and disappearance of magazines, first stories by major writers, important works, etc., by date. Deep Probes is a section examining the place of science fiction and major concepts involved. Fandom and Media is a fourth section. The second section, Thematics, is the longest and probably most important; in this, the basic themes of science fiction are traced historically and analyzed, with the major works that fall into such areas. Here each theme is introduced in a short discussion by some major writer; then its history is traced by one of the staff researchers.

Not surprisingly, since the book was produced in England, there is a strong British slant to many of the articles, and some tendency to follow the current "literary" values of some of the British writers and fans. There is also a great deal of variation in the worth of the articles, with a range from excellent to rather mediocre.

It's a useful reference, with the reservation that some of the value judgments behind it sometimes need questioning. But I think many will find it well worth the price for the illustrations alone.

For those who admire the art of Stephen E. Fabian, Gerry de la Ree (7 Cedarwood Lane, Saddle River, N. J. 07458) has just issued **Fantasy by Fabian** (126 pp., $15.00) in a handsome, limited edition. This is a selection of Fabian's best work, superbly

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printed on large, glossy pages, with text by Gerry de la Ree. Most of the illustrations are of nudes, and all are black-and-white. It's a fine example of work by a fan who is an artist, produced by a fan who has become a publisher.

I'm not sure whether to call Paul A. Carter a fan or not. He has written some science fiction and obviously has been a longtime reader of science fiction. Perhaps he should be classed as fan-turned-academic, since he's currently professor of history at the University of Arizona. His **The Creation of Tomorrow** (Columbia University Press, 318 pp., $12.95) is also hard to classify.

Probably the best way to describe it is to say that it is a collection of essays on the development of a number of basic ideas in the magazines, as contrasted frequently with the general attitude prevailing at the time. There are ten of such essays, dealing with science vs. fantasy, space travel, aliens and other planets, time travel, racism, superman and psi, sexism, robots, cycles and dooms, and ecology (including the "ecology" of the magazine market). There is a final section on science fiction in books.

It seems to me that the essays vary considerably in their value. Thus the first two essays are generally excellent, if rather obvious to most science fiction readers. Those on racism and sexism are good enough, but hardly very enlightening. And the one on robots seems to be very selective, concentrating mostly on the robot as a cause of man's devolution, ignoring many stories of the opposite bent.

There are also a number of careless errors that may irritate some readers. Carter says that Gernsback picked Burroughs' *The Master Mind of Mars* for reprinting—when the story was original to the magazine. Or he says, page 218: ". . . until Southern California mindlessness overcame him (Heinlein) in *Stranger in a Strange Land*." Unfortunately for that theory, Heinlein was living in Colorado in 1961 and didn't move to California for some time after. Careful reading would show a great many other errors.

Still, it's an interesting book, though hardly a history of science fiction in the magazines nor a complete coverage as the book jacket indicates. Whether it's worth the price to science fiction readers, however, is doubtful.

Probably everyone has seen some television discussion of **In His Image** by David Rorvik (Lippincott, 239 pp., $8.95). It deals with a millionaire who purportedly hired a scientific staff to give him a child by cloning, with a successful outcome.

Whether to call this fiction or fact is a matter of argument. (For fiction, it is hardly written as good entertainment.) I do not believe the story. But the citations in it are correct, and the process of finding ways to achieve a viable clone is well detailed. Given the slight advance covered in the book, I'm willing to admit that it could all happen this way.

Anyhow, it's fun to see an old idea of science fiction turned into a book for mass reading and taken seriously enough to give it verisimilitude without the need of our much-discussed "will to believe." I recommend it as a

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book to read, if not to accept. The book makes an interesting contrast between what cloning might really be and some of the overly fanciful ways the subject has been treated in science fiction.

The book is sure to be out in a paperback edition in the near future. Get it then, if not before.

Fortunately, while a lot of people are busy writing about science fiction or the things that used to be science fiction, there are others busily engaged in turning out such fiction. And among these, a fair number are fans, both active and otherwise. Marion Zimmer Bradley, for instance, was and remains a true fan; her first fiction that I can remember was published in a fanzine more than a quarter century ago. Since then, she has become one of the most skillful writers in the field.

Her latest novel is **Stormqueen** (DAW, 368 pp., $1.95), and it's another story of Darkover—by now one of the most fully realized of the worlds of science fiction. This time, however, it isn't about the period when Darkover has been discovered by the men of Earth, with the conflict placed between the natives and the Terran Empire.

Instead, Bradley has gone back long before the coming of the terrans. This story even precedes the period of chaos when the great powers commanded by the Darkovans got out of control, long before the Compact against anything but hand-to-hand combat.

As has been the case for all her recent novels, this is a complicated story with many threads and subplots. But the key to it all is Dorylis, a young girl whose *laran*, or psychic power, is such that she can control the storms and direct lightning to strike where she wills. She's still a child, however—a rather badly spoiled child. And unless she can discipline herself to master her talent, it must master and destroy her—and those about her. Then she becomes involved in a grim war being waged against the stronghold of her father, Lord Aldaran.

I'm not entirely happy about one small section near the end where Dorylis suddenly seems to have a change of heart that isn't justified as well as I'd expect from Bradley; she seems suddenly too mature and too altruistic. But that's a small point in an excellent story, in all other ways.

I enjoyed the novel, and hope now that Bradley will go on to cover a lot more of the history of Darkover, hitherto only revealed in tantalizing hints. Highly recommended.

And Having Writ . . . by D. R. Bensen (Bobbs-Merrill, 224 pp., $8.95) is a first novel, but hardly by a writer new to science fiction. Donald Bensen was the editor at Pyramid Books whose knowledge of the field enabled him to obtain many of the old classics for them, back when paperbacks were just beginning to publish science fiction.

This is a story of four exploring spacemen who get trapped on a backward world when they crash—and who must somehow manage to increase native technology enough to repair their ship. Not too new an idea—but the treatment given the idea certainly is new.

The novel is a mixture of gentle satire and a wry humor (though once in a while it descends to something

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like slapstick); and there is also a certain rather amused warmth in the telling that is a welcome change from the lack of real feeling that afflicts too much satiric writing.

I'm glad to see Bensen add his name to the long list of editors who have contributed their own fiction to the field.

C. J. Cherryh has proved to be one of the fine new writers who is both good and prolific. Now she has begun a trilogy, the first book of which—quite complete in itself—is now out. **The Faded Sun: Kesrith** (Science Fiction Book Club, 248 pp., $1.98) is a novel that deals with three races in the aftermath of an interstellar war which has been won by the terrans. The central race in the story is the mri. This is a race of warriors and supporting castes with an elaborate culture of rigid discipines and traditions. As long as the mri can remember, they have lived by sending forth their warrior caste to fight all the battles for the regul, who are a trading race, totally incapable of doing their own fighting. (In fact, their adults are incapable of standing or moving without help.) To the mri, honor is everything; to the regul, the word has no meaning.

Now the regul have wasted almost all of the mri in their lost war against the terrans, until only one young kel (or warrior) is left on the barren, harsh world that is their home. The regul are abandoning the planet to the terrans as spoils of war, deserting the mri.

Most of the story is seen from the view of Niun, a young mri kel. But to his shame, he has never been blooded, never been permitted to go into combat and gain honor that should be his by right of his skills. His people are ruled by his grandmother, a matriarch and priestess who guards the rites and traditions of the mri. She has kept him near her as if he were still a mere child. Yet now it falls on him to take on the task of trying to save all that is left of his people and his way of life, against restrictions that are still imposed by the matriarch and against both terrans and regul.

To complicate things, he is forced to save and protect a human, Sten Duncan, while considering him still a potential enemy.

There's a great deal more to the story, and much more to the involvement of Duncan and Niun. But above all else is the strong development of the fascinating culture and the history of the mri. Cherryh has a splendid talent for making an alien culture real without holding up the story.

After the ending of this novel, I can't quite figure out how she is going to carry on for two more novels. I look forward to her answer. And meantime, I recommend this one as a fine novel.

Among the reissues, I'm happy to see that Avon is finally getting around to putting out A. Merritt's **The Face in the Abyss** (278 pp., $1.75). This is one of the best fantasies Merritt ever wrote and the last I remember it being issued by Avon was more than twenty years ago—though they've been issuing some of his poorer work at frequent intervals. It's one of the true classics of romantic adventure fantasy.

Now maybe Avon will be kind enough to bring out *Creep, Shadow.* Or would that be asking too much? ■

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Brass tacks

Dear Mr. Bova:

Because of the nature of the article that you requested me to review ("The Disposal of Nuclear Waste In Space," Michael McCollum, March 1978), I am naturally unable to comment upon it in any official capacity. However, I offer some general comments which, I trust, may be of some assistance to you and your readers.

The subject of the paper has been seriously studied over the past 6 years. Please refer to NASA Technical Memoranda TM X-2911 and 2912 issued by the Lewis Research Center in December, 1973. I believe that the matter is still under study by NASA's Marshall Space Flight Center and Jet Propulsion Laboratory, and it has a few advocates within the aerospace community.

TM X-2911 discusses the matter in its executive summary. . . . You will note that the concept centered upon disposing of the long-lived uranium-free actinides with the attendant premise of separating fission products (short-lived) and storing them on earth and only disposing of the actinides or transuranium elements in space. Also note that solar system escape launch was found to be the most desirable, economically feasible, and technically reasonable.

A cursory survey of the nuclear community peers on the subject reveals that there are few, if any, who take the mode of nuclear waste disposal in space seriously *today*. They have some convincing arguments including:

1. The existence of numerous geological blocks in North America and the North Pacific Gyre which have proven tectonic stability for tens of millions of years, which are considered quite suitable for safe nuclear waste disposal.
2. The Oklo uranium deposit in Gabon, Africa, that was a true natural nuclear reactor running years ago geologically that does not represent a hazard to people and the environment today, even though it is being uncovered and mined for uranium.
3. The complexity, attendant costs, and dynamic risks of preparing and launching the radiation and heat-producing actinide package compared to static terrestrial geologic disposal, which would still be required for fission products, weigh heavily against the concept today.

Admittedly, I have my own bias. The nuclear wastes contain large and potentially valuable resources whose intrinsic value is measured in the billions of dollars and whose strategic potential has not yet been realized. . . . The U.S. is only endowed with Mother Nature's given and exhaustible resources, and we can only create new ones by nuclear processes like fission, neutron capture, or fusion. So I would personally consider nuclear waste utilization and someday resource creation by nuclear processes as the future scenario. However, some waste isotopes will always require disposal if uses are not found for them; these are generally fission products (short-lived) not actinides (long-lived).

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After twenty years in the space nuclear business, dozens of nuclear launches, three aborts (including Apollo 13's nuclear payload), I am a pragmatist. If I had the time I would suggest various technical changes in the paper and would excise some of the nontechnical phrases in the text that have popular appeal to readers. I would not use a weak case . . . to advance my thesis after dismissing arguments against terrestrial geologic disposal as ridiculous. . . . I would not use nuclear waste disposal as the primary raison d'être to unlock the door to space . . . or to promote space transportation systems. . . .

But, that is my way, and our author is young, enthusiastic, and visionary; the paper is in a popular vein not a technical one; and who is to say what we can do in the Year 2000.

Sincerely,

GEORGE P. DIX

Mr. Dix has been involved in space nuclear safety engineering since 1958, and is the author of technical papers such as "Beneficial Utilization of Nuclear Waste—1977," presented at the Intersociety Energy Conversion Engineering Conference in Washington, D.C., last year. He has worked in both industry and Government, and wishes to emphasize that his comment here is as a private citizen.

Dear Ben,

I just finished Michael McCollum's article on nuclear waste disposal and it occurs to me that instead of just dumping the stuff, we might put it to some use. With a little extra effort it could speed up our contact with alien civilizations.

Before someone yells, Throw the nut out, let me explain.

Leaving aside the technological problems involved, a major problem involved in contact could be that they don't want to talk to us. We might just be too backward to be considered company.

If, on the other hand, we become galactic litterbugs, and start sending several thousand pounds of radioactive waste to nearby stars, they might just start talking to us. If only to get us to stop.

True, the response might not be a pleasant one, from our point of view, but it would settle the question of extraterrestrial life. The waste heat from the material could always be used to power on-board systems, including a semi-intelligent computer that could apologize for us.

LESLIE WALTER

72 Central St.
Farmington, NH 03835

Interstellar space is vast, and mostly empty. On the other hand, if Murphy's Laws are truly universal, this scheme just might work!

Dear Mister Bova:

I've just read Michael McCollum's article, "The Disposal of Nuclear Waste in Space," in the March Analog and I enjoyed it thoroughly. However, I feel that Mister McCollum could have made his choice of lunar impact disposal more persuasive had he realized that the solar escape possibility is not available to the Interim Upper Stage as he foresees its use. The additional 4.57 kilometers per second that he proposes to give the IUS from low orbit would indeed allow it to escape from Earth, but the craft would still follow Earth's orbit about Sol,

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possibly to come back some day, as Cosmos 954 did . . . to haunt us. To escape from Sol requires an additional 12.5 kilometers per second, a mission that requires a mass ratio of 34.47. If we plug that figure into Mister McCollum's payload formula, we find that the IUS will carry Minus 3260 pounds of waste (antimatter?) out of the solar system. Even the easier task of dropping the loads into Jupiter (same advantages as solar impact) is not possible with the technology that the article assumes. Since we want to keep costs low and we presumably want to keep the Lagrange points clear for human settlements, then lunar impact seems to be the only way to go. Let's make Sinus Iridium Earth's nuclear burial ground. . . .

DENNIS ANTHONY
3116 Kelton Avenue
Los Angeles, CA 90034

Oh, you want the Shining Bay to really glow in the dark, do you?

Dear Mr. Bova:

M. A. McCollum's article on nuclear waste disposal which appeared in the March, 1978 issue of Analog was timely, interesting, and well written. However, much of McCollum's article is based on an inaccurate picture of the back end of the nuclear fuel cycle. For example McCollum states, "Following the cooling period, the fuel is shipped to a reprocessing plant where it is separated from the waste. The waste products are then solidified and prepared for disposal." This statement is in sharp conflict with the facts of here, now, and in the immediate future.

First of all *no, none, not any* high level waste from any commercial power plant has yet been solidified. Until recently, all research on solidifying commercial reactor waste has been based on the use of military waste to which have been added materials to simulate commercial waste. (The radioactivity of commercial waste is approximately 150 times greater than that of military waste.)

Second, at this time no commercial fuel reprocessing plant is in operation. Only one such plant has ever operated, (Nuclear Fuel Services at West Valley, New York) and it was closed in 1972 for maintenance, expansion, and upgrading. In 1976 all plans for reopening this plant were abandoned because in order to make the plant economically viable the cost to utilities for reprocessing spent fuel would have been one million dollars per metric ton of spent fuel. (The letter notifying utilities of the million-dollars-per-ton cost became known in the nuclear industry as the million dollar letter.) On this basis, fuel reprocessing costs for the thirty-year life of the Palo Verde class reactor would be of the magnitude of one billion dollars in 1976 dollars. This would equal the total construction costs of the plant.

Thirdly, McCollum did not give adequate consideration to the current cumulative inventory of high level waste. As of 1976, there were 76,200,000 gal of military waste, 600,000 gal of commercial waste stored at West Valley, N.Y., and about 2,240 metric tons of spent fuel. If all of these high level wastes were converted to solid form they would occupy a volume of 7 million cubic feet.

Lastly, McCollum limits his discussion of safety by not presenting the

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level of radioactivity involved. The radioactivity inventory of the core of a 1000 megawatt reactor after 550 days of operation is in excess of 8 billion curies.

Regardless of cost, the waste disposal problem must be solved. The concept of disposal in space has some merit, but I believe McCollum's article would have had more merit had it reflected the state of existing technology and the magnitude of the danger involved.

E.G. GARRETT
Box 91
Stockton Springs, ME 04981

Author McCollum responds:
Dear Mr. Bova:

The following is my response to the letter from E.G. Garrett of Stockton Springs, Maine, concerning my article, "The Disposal of Nuclear Waste In Space":

The letter from Mr. Garrett raises several interesting points. His comments about the current state of the art of nuclear waste reprocessing are correct. The government has been screwing around for years trying to decide which of several methods is best for reprocessing LWR (light water reactor) waste. The article, however, dealt with the *space* disposal of waste—not the reprocessing of nuclear fuel. Fuel reprocessing is a constant in the economic equation. Regardless of the disposal method, the fuel must first be reprocessed. Anyone interested in fuel reprocessing should see *The Reprocessing of Nuclear Fuels* by William P. Bebbington, Scientific American, December, 1976. If you are a glutton for punishment, try ERDA Report—*Alternatives for Managing Wastes from Reactors and Post-Fission Operations in the LWR Fuel Cycle* (ERDA-76-43), 1500 pages.

Current ERDA studies indicate the cost of reprocessing spent commercial fuel will be approximately $300,000 per metric ton. This represents 3% of the yearly cost of generating power at the Palo Verde Plant for each reactor. At one million dollars per ton, it isn't surprising that Nuclear Fuel Services went out of business.

Seven million cubic feet of solid waste? The statistic is widely published and somewhat suspect. That's 200,000 tons of waste produced by 5 million tons of spent fuel. Yet we only produce 300 metric tons of spent fuel a year at present. That seven million cubic feet must contain a lot more than high level fission fragments.

It was never my intent to minimize the problems of fuel reprocessing in the article. However, they shouldn't be overstated either. The technology of handling weapons program waste is now forty years old. Surely we have made enough progress in four decades to be able to handle the higher activity commercial waste. As for the mountain of waste we have accumulated, we need to work on means for separating out the most highly dangerous elements (laser separation of isotopes, perhaps), instead of the historic trend to dilute the waste at every step.

Mr. Garrett's conclusion is absolutely correct. The waste exists now and will exist for untold thousands of years. It must be disposed of as it will not go away. I opt for space.

MICHAEL A. MCCOLLUM
1931 East Libra Drive
Tempe, AZ 85283

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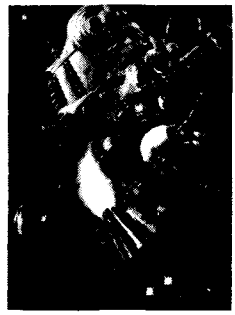

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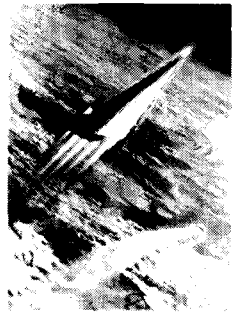

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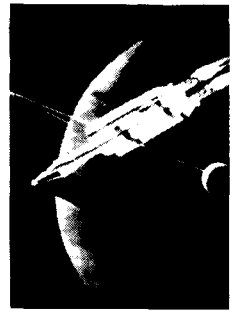

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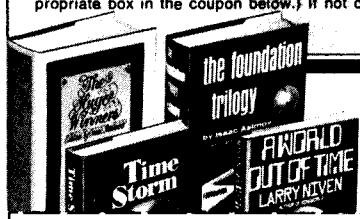

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